FISCAL YEAR 1984 NOAA AUTHORIZATION

HEARINGS

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AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

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FISCAL YEAR 1984 NOAA AUTHORIZATION

TUESDAY, MARCH 1, 1983

House of Representatives,
Committee on Science and Technology,
Washington, D.C.

The committee met, pursuant to notice, at 9:37 a.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman of the committee) presiding.

Present: Representatives Fuqua, Winn, Brown, Walker, Scheuer, Sensenbrenner, McGrath, Walgren, Skeen, Schneider, Lowery, Chandler, Volkmer, Bateman, Boehlert, McCandless, Dymally, Mineta, Durbin, Andrews, Valentine, and Wirth.

Mr. **Fuqua**. The committee will be in order.

Today we continue a series of posture hearings with officials from major Federal research agencies. We are pleased today to welcome Dr. John Byrne, the Administrator of the National Oceanic and Atmospheric Administration.

NOAA is the lead agency, both in terms of services and research, for the Federal oceanic and atmospheric programs. It conducts these activities in a wide variety of areas, including weather forecasting, tornado and hurricane warnings, remote sensing from space, oceanographic research, ocean dumping research, and fisheries management.

In this fiscal year the NOAA budget totals nearly $900 million, of which some $200 million, nearly one-quarter, is devoted to research and development. The request for fiscal year 1984 constitutes a reduction of approximately 15 percent in this budget, and the committee will be most interested in hearing Dr. Byrne's views both on NOAA's priorities and on his plans to fulfill NOAA's many congressional mandates with these reduced financial resources.

In addition to purely fiscal decisions, there are several important policy questions that we will consider in examining the NOAA request. We are concerned that a disproportionate percentage of the proposed reduction in NOAA's budget seems to be in oceans programs and in the areas of research and development. Do these trends signal a fundamental shift in the agency's goals?

Under this budget proposal, we also note that NOAA personnel levels would be reduced to their lowest since 1970, which raises concerns about NOAA's ability to provide essential public services, especially weather services. We also intend to examine NOAA's central role in the commercialization of remote-sensing satellites. The committee hopes to work with the administration in developing a policy which will maintain our technological leadership without compromising national interests or stifling commercial competition.

At this time I would like to recognize the ranking minority member, the gentleman from Kansas.

Mr. **Winn**. Mr. Chairman, thank you very much.

I, too, am very pleased to welcome Dr. John Byrne here today.

The President's 1984 budget request for the National Oceanic and Atmospheric Administration proposed an overall program level of $843,172,000, which will fund the essential ongoing program activities and a limited number of program increases in the high-priority areas, as we understand it.

The NOAA budget request is consistent with the administration's efforts to reduce the overall level of Federal expenditures, eliminate unnecessary or low-priority program activities, and transfer the conduct or support for certain Federal program activities to State and local governments or the private sector, wherever appropriate.

The National Oceanic and Atmospheric Administration has recently implemented a far-reaching reorganization to improve its management of ocean and atmospheric resources and its delivery of services to the public.

I want to commend Dr. Byrne for his part in developing and implementing a reorganization, and express my confidence in his ability to lead the agency in carrying out its mandate in these difficult budget years.

I look forward to receiving your testimony, Dr. Byrne. Welcome.

Mr. **Fuqua**. Mr. Scheuer.

Mr. **Scheuer**. Thank you very much.

I welcome back Dr. Byrne.

We all understand there is a belt-tightening process going on in our Government, and that there must be, to get our fiscal house in order. However, the NOAA belt tightening represents over a 15-percent reduction in funds allocated both for services and research in the sea and in the air, in programs that are critically important to our own citizens—to our farmers, for example, to people who rely on weather forecasting services, and to hundreds of millions of people in the developing world who rely on other services that we are rendering them through our satellites.

It is difficult to understand how NOAA will be able to carry out its programmatic responsibilities and its other missions which Congress has mandated to it.

This year's budget calls for deep cuts in the areas of atmospheric programs, satellite programs and data services, and ocean programs.

You propose the elimination of agricultural weather services, which will cost less than $1.5 million. It provides farmers in 40 States, Dr. Byrne, with information needed to give them advice and counsel on the optimum time and the optimum way to irrigate crops and protect them from frost, to plant, fertilize, spray, and harvest.

I just fail to understand how any conceivable cost-benefit analysis—you would deprive millions of American farmers of these services—would justify saving a paltry $1.5 million.

You would go from two polar-orbiting satellites to one polar-orbiting satellite. This suggestion has been made in the past and, as you can very well recall, it has been met with strong bipartisan opposition. There has been strong bipartisan support for maintaining the two-orbital-satellite system.

The two-satellite system provides better weather forecasts. It avoids the threat that a one-satellite system raises that there will be no backup, and a total gap in the satellite coverage is very likely. Not only do our farmers depend on this system, but farmers in over 120 developing nations depend on the data that they get from us, that they can get from no other source, that is a lifeline to them, and that resounds tremendous credit on the United States. At a time when we are spending billions of dollars overseas, this particular program of giving aid to farmers in the developing nations has achieved enormous credibility for the United States. To me, it seems bizarre that you would even think of eliminating this program.

NOAA's responsibilities also include research and monitoring of ocean pollution, including municipal, industrial, and radioactive waste disposal.

Just last year we had a Federal district court override the decision of EPA to prohibit ocean dumping. We had hearings here with NOAA and with EPA, and we gave you the mission and we put an amendment into law, as I recall, and put in some line item funding, so that you could do cross-media research on what would be the least environmentally degrading way of ridding ourselves of solid waste. That is a 5-year program and will cost money, but it will give us data that is indispensable for Congress in making the decision it has to make, and for NOAA, and especially the EPA to make the decision it has to make.

To cut off this kind of research at this time seems to be an act of gross folly.

If NOAA abandons it ocean-dumping research, no other Federal agency can be expected to continue this program.

Let me just say, in summary, that you have a record to be proud of. We commend you on the bipartisan respect and credibility that you have achieved in your 12-year history. You have been a well-run, effective agency. You have administered the development, the use, and protection of our atmospheric and oceanic resources in the most professional way.

The bipartisan support this committee has shown in the past to NOAA and its activities is a reflection of our confidence in you, our confidence in your professionalism and the integrity of this agency, and also to a long-term commitment to the oceans and the atmosphere and our national will to protect them and enhance them.

I hope, Mr. Chairman, that Dr. Byrne will address these issues today and show us that the missions Congress has mandated to NOAA will not be overlooked in the interest of short-term fiscal constraints.

Mr. **Fuqua**. Thank you, Mr. Scheuer.

Without objection, I would like to include in the record a statement by Mr. McGrath and another by Mr. Lewis.

[The prepared statements of Mr. Scheuer, Mr. McGrath and Mr. Lewis follow:]

STATEMENT OF THE HONORABLE JAMES H. SCHEUER

Mr. Chairman, I, too, am very pleased to welcome Dr. John Byrne here today.

The NOAA budget we are reviewing for fiscal year 1984, like that proposed for fiscal year 1983, reflects the current difficult fiscal climate. Understandably, many agencies must tighten their belts in order to help reduce our national deficit to manageable proportions. However, the proposed NOAA budget represents over a 15 percent reduction in funds allocated for both services and research in the sea and in the air. With such large reductions in funding for NOAA, it is difficult to understand how that agency will be able to carry out the missions and programmatic responsibilities which Congress has mandated for it. This year's budget calls for deep cuts in the areas of atmospheric programs, satellite programs and data services, and ocean programs, among others. For example, within Atmospheric Programs is the proposed elimination of Agricultural Weather Services, which at a cost of less than $1.5 million, provides farmers in over 40 states with information needed to irrigate crops, protect them from frost, and to plant, fertilize, spray, and harvest at the optimal time. This program in the past has proven to be a highly cost-effective service; the proposed reductions in this area would appear to be counterproductive. Proposed satellite program reductions include eliminating one of two polar-orbiting weather satellites. Proposals in the past to downgrade this system have resulted in strong bipartisan support to maintain the existing two-satellite system. NOAA's responsibilities also include research and monitoring of ocean pollution, including municipal, industrial, and radioactive waste disposal.

Included in this year's budget is a proposal to terminate ocean dumping research in areas including the New York Bight and Puget Sound. If NOAA abandons its ocean dumping research, no other Federal agency can be expected to continue these programs. As a result, we as policy-makers will be forced to reach decisions on complex waste-disposal issues without adequate environmental information. In its 12 year history, NOAA has proven to be a well-run, effective agency to manage the development, use and protection of our atmospheric and oceanic resources.

The bi-partisal support this committee has shown in the past to NOAA activities is a reflection of the long-term commitment we have made to our oceans and atmosphere.

I hope Dr. Byrne will address these and other issues in his testimony today, and will show us that the missions Congress has mandated for NOAA will not be overlooked in the interest of short-term fiscal constraints.

STATEMENT OF THE HONORABLE RAYMOND J. MCGRATH

Mr. Chairman, I am very pleased to join you in welcoming Dr. Byrne here today.

The 1984 budget request for the National Oceanic and Atmospheric Administration is $843.2 million. This request reflects our troubled economic situation and also, I am sure, some very difficult decisions.

I have some serious concerns about many of the proposed reductions, and I look forward to Dr. Byrne's explanations of the rationale for some of the reductions. I am particularly concerned about the proposed reductions in the polar orbiting weather satellites, long-term R&D in the National Weather Service, and in the operational offices of the Weather Service.

I look forward to Dr. Byrne's testimony. It will be very valuable to the members of the Science Committee in our deliberations on the 1984 budget for NOAA.

STATEMENT OF CONGRESSMAN TOM LEWIS

Mr. Chairman, I am pleased that the committee has the opportunity to hear from Administrator Byrne, of the National Oceanic and Atmospheric Administration, regarding the agency's proposed budget for fiscal year 1984.

While I support the administration's efforts to reduce excessively high budget deficits, I am particularly concerned that the proposal to close seven agricultural weather stations and eliminate the fruit frost warning program is one example where the administration is attempting to save money in the wrong area.

The cost of maintaining these stations and operating a fruit frost warning program is minimal compared with the value of the critical information that is provided to farmers and growers in States like Florida.

I will be interested to hear the Administrator's explanation of these program changes.

Thank you, Mr. Chairman.

Mr. FUQUA. Dr. Byrne, we would be pleased to hear from you.

STATEMENT OF DR. JOHN V. BYRNE, ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ACCOMPANIED BY JAMES W. WINCHESTER, ASSOCIATE ADMINISTRATOR; JAMES SMITH, BUDGET OFFICER; DR. ANTHONY J. CALIO, DEPUTY ADMINISTRATOR; RICHARD E. HALLGREN, ASSISTANT ADMINISTRATOR FOR THE NATIONAL WEATHER SERVICE; JOHN McELROY, ASSISTANT ADMINISTRATOR FOR THE NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE; AND NED OSTENSO, ASSISTANT ADMINISTRATOR FOR OCEANIC AND ATMOSPHERIC RESEARCH

Dr. BYRNE. Thank you, Mr. Chairman.

I appreciate the opportunity to share some of our thoughts with you concerning those programs. We have submitted a testimony for the record. However, I would like to make a few comments and then summarize some of the highlights of that testimony.

Mr. FUQUA. Before you proceed, we will make the statement in its entirety part of the record immediately following your oral testimony. Therefore, if you wish to summarize, we would be happy to hear from you.

Dr. BYRNE. Thank you.

As Congressman Winn has indicated, we have spent considerable time and effort during the past year in reorganizing the agency. The primary thrust of this reorganization was to improve our efficiency and to improve our service to those who use the ocean and to those who require information with respect to the atmosphere.

We have focused on all of the aspects of the ocean and the atmosphere in our reorganization and have attempted to improve the focus, particularly with respect to our activities in the ocean, and at the same time to maintain and to highlight our activities as they pertain to our weather and atmospheric conditions.

In creating the new NOAA organization we have attempted to elevate some of the services to a position of prominence with respect to the administration of the agency. The National Weather Service, for example, was at one time located under an Assistant Administrator for Ocean and Atmospheric Services. At this time under our new organization the Weather Service will be under the jurisdiction and under the responsibility of an Assistant Administrator.

In our reorganization we have created four services and one supporting research unit. The four services include the National Weather Service. The second is the National Environmental Satellite Data and Information Service. In this particular category we have combined our former satellite operations with those of the Environmental Data and Information Service. We believe that this will provide a focus for us with respect to all types of environmental data and information.

The National Marine Fisheries Service has been retained as it was previously, and we have created a new National Ocean Service in which we have coordinated and brought together all of the many activities involved with ocean activities within the agency.

In addition, we maintain our research and development capability in the Office for Oceanic and Atmospheric Research.

During the coming year we anticipate the addition of two other elements which presently exist in some capability but not completely. We anticipate the creation of an Ocean Service Center or series of Ocean Service Centers which will provide all the talents and skills that NOAA possesses to those who use the ocean. The first of these we anticipate will be created this summer. It will be in operation this summer, with the second and third, hopefully, in operation before the end of the calendar year.

In addition, we see that NOAA is a user-oriented agency and that we need to enhance our capability of interaction with the users. In this regard, we will begin to develop and to coordinate all of our many extensions and outreach programs under a single extension focus: a marketing focus, a user focus, whatever term that you prefer.

It is our hope that in doing this we will also provide a greater focus on the proper role of the Federal Government in ocean and atmospheric activities. Many of the activities which we have carried out in the past will be subject to user fees where they are provided for specific users. Many of our activities will be evaluated with respect to whether they might be contracted to private enterprise rather than carried out by the Government itself. Many that we focus on will be transferred specifically to the private sector for activities by the private sector.

During the past year we have maintained our activities in ocean and atmospheric research and service. It is very clear that our knowledge of the fundamentals of ocean and atmospheric processes and the interaction between these has improved significantly. Temperature and precipitation estimates are now 85 percent accurate, and 5-day forecasts are as good as 3-day forecasts were 10 years ago.

We also have had significant success recently in making seasonal climate forecasts and anticipate that these will continue to improve in the future.

With respect to the National Weather Service, the basic objectives continue to be the protection of life and property by providing essential forecasts and, on a secondary basis, to promote the economic development of the United States by supplying private industry and Government agencies with appropriate and timely weather and climatic service.

We have during the past year seen the development, rapid development, of technological advances in radar, geostationary satellites, automatic weather systems, hydrologic observations, and remote-sensing systems. We think that all of these new technologies give a great potential to our capability to improve our predictions in the future.

We recognize the need to improve our management efficiency and have instituted, with a contractor, a study of the Weather Service to determine the most effective way in which to operate the Service.

During the past year we have seen the need—the enhanced need, I would say—to develop the Nexrad system of Doppler radar, which would increase our warning lead time for larger and more destructive tornadoes from the current 1 or 2 minutes to as much as 20 minutes. We propose an increase of $5.7 million to continue in a joint interagency program with the Department of Defense and Department of Transportation in developing a Nexrad system. We understand a corresponding budget increase is being requested by both the Department of Defense and the Department of Transportation to insure that, to the extent possible, we will be able to validate and develop the Nexrad system during the coming year.

In our attempt to streamline the management of the National Weather Service, we are proposing the redivision of our activities from four coterminous National Weather Services regions into three managerial areas. This is strictly a management function. It should in no way affect the ability to predict and forecast weather. However, we do believe that this will accrue a savings of about $1.2 million.

We anticipate the consolidation of our Pacific and Alaska regions, which will generate a savings of something on the order of $400,000.

We feel that we may be able to improve our efficiency to the extent that we can eliminate regional hydrologists at each of the headquarters offices, again accounting for more than a half million dollars in savings.

As has been mentioned, we are proposing a savings of more than a million dollars by terminating some of the agricultural and firewatch services. I anticipate some questions on this in the period that follows.

The successful demonstration of the automation of field operations and service, a system commonly referred to as AFOS, permits us to accelerate our plans to phase out some of the obsolete teletypewriter and facsimile systems which have been so characteristic of Weather Service stations in the past.

In addition to the activities which are directly related to the weather forecasts, we maintain a climate program and are the host agency for the national climate program. The national climate program office is responsible for three activities which are mandated by the Climate Act: experimental climate forecasting, Federal-State cooperative studies, and measures for increasing international cooperation.

We believe that great strides can be made in the area of climate, and feel that this is most appropriate and is most important to the economy and the future well-being of the United States.

I think it is particularly appropriate that we mention an outstanding success in climate forecasting which we achieved this past winter. As many will recall, there were a number of forecasters who predicted record low temperatures for the winter months in the Eastern United States. However, the National Weather Service predicted above normal winter temperatures for the area, based in part on analyses of Pacific Ocean temperatures and precipitation patterns. It has been very clear that this was an outstanding success.

I would also mention that in the predictions made by the Weather Service for the long-range forecast, although those of us in the East are most cognizant of the changes that occurred during the winter in the East, the Weather Service was also right on target with respect to their predictions for the rest of the country as well.

Much of this activity was a result of an understanding of some of the processes taking place in the Pacific Ocean, and we are presently following up on this in an international research program, commonly referred to as the tropical ocean global atmosphere program. I will mention a bit more about this in a moment.

During the past year the Mexican volcano, El Chichón, erupted, dispensing massive amounts of ash and sulphurous gases into the stratosphere. These activities are being closely monitored by NOAA through the programs we have at four stations, four long-term climate measurements at Port Barrow, Alaska; Mount Aloha; American Samoa; and the South Pole.

We will continue to monitor this. Current opinion indicates that El Chichón did not affect this winter's weather but may contribute to a slight cooling over the next several years.

I mentioned earlier the importance of the measurements in the Pacific with respect to long-term, seasonal forecasts. Temperature fluctuations in the equatorial Pacific have led us to believe that there are some climatic instabilities taking place. At the present time an oceanographic phenomenon referred to as El Niño, an anomalous warming of the water in the eastern Pacific, is in progress. The results of El Niño frequently lead to great changes in fisheries, the killing of anchovies, and subsequent destruction of life along the coastal areas of North and South America in the Pacific.

The El Niño event which is presently taking place brings about severe rains, and so on. We were well aware that this was happening. In fact, it was predicted, and this present El Niño, that will probably be the best documented one in history, we feel we will learn a considerable amount about the interaction between the atmosphere and the ocean as a result of following this event this year.

The weather observation and prediction programs in fiscal year 1984 will continue to develop new techniques. We have new observational capabilities which have been developed during the last year. These include an airborne Doppler radar system which permits detailed observations of atmospheric events such as microbursts, which have been responsible, we think, for a number of tragic aircraft accidents at airports.

A second technological development during the past year has been the development of a vertical profiling system, which we refer to as Profiler. This system continuously remotely measures the winds, temperature, humidity, and water vapor at various levels in the lower portions of the atmosphere. It has important atmospheric dynamic research applications. We believe that it may replace radiosondes which are released with balloons twice daily. The Profiler gives us the opportunity to make continuous measurements, whereas the radiosonde measurements are only made at two different times.

The prototype regional observing and forecast system, which we refer to as PROFS, has been installed as a prototype at the Stapleton Airport in Denver, together with Profiler. We believe that the PROF system, which makes use of the most recent technology, will serve as the prototype for many of our weather observations in the weather stations of the future, and we will continue to develop these techniques.

A topic which has come to the attention of this committee in the past is that of solar terrestrial research activities, which presently take place in Boulder, Colo. NOAA itself is a relatively small-scale user of the solar terrestrial services, and the possibility of transferring these services either to the Department of Defense, to NASA, or to private industry, or a combination of all three, who represent the major users, is being explored. NOAA will continue to collect and process space environment data in real time and to provide a reduced level—we estimate 8 hours a day, 5 days a week, rather than 24 hours a day—of forecasts and warning services to Federal agencies, industrial users, foreign governments, and university researchers.

Measurements will continue to be made on a continuing basis and will be available to those users who have computer linkups directly with the facility in Boulder.

In the area of marine observations and predictions, we will continue to develop techniques for forecasting conditions in the ocean environment to serve the various coastal and offshore users. These involve measurements of ice processes, ocean and Great Lakes circulation, fish recruitment, climate forecasts, severe weather alerts, and so on.

Many of the measurements and techniques we are developing will permit more accurate sea-state forecasts, give us the capability of improving our storm track predictions, and generally lead to a more sophisticated understanding of sea-air interactions, which we think in the long term will improve all of our forecasting of the ocean and atmospheric conditions over the ocean, and most specifically in terms of hurricanes and storm-surge systems in coastal areas.

In the area of marine pollution assessment, processes of bottom deposition and resuspension, and the effects on the lower aquatic food chain are not particularly well understood. We recognize this and will use these as a target for much of our attention during the coming year.

A second major thrust will be that involving a study of trace metals in the marine environment. Present research indicates that metals are subject to various chemical and biological processes that may transform them from pollutants to relatively harmless biological complexes. A study of metal interactions with organic compounds and with particulate matter, the deposition of man-made contaminants, and the water sediment interface at the bottom, and the physical and chemical transformation of pollutants, we believe will permit us to make wise multiple use of the seas not only as a food and fiber source, but also as a repository for waste products.

In the area of general research, I would like to mention just a few activities.

With respect to air quality research, we will continue to monitor the global concentrations of carbon dioxide, ozone, freon, and other atmospheric constituents at the four stations I mentioned earlier, stretching from Point Barrow, Alaska to the South Pole. At these stations we will continue to measure unusual events, such as the activities provided by El Chichón.

Our activities in acid rain research will continue. We have found during the past year that biological sulphur compounds have been measured in both the Atlantic and Pacific Oceans that could act as precursors of acid precipitation. These findings help to explain relatively high acid concentrations at remote sites such as Australia, Hawaii, and the southern Indian Ocean.

We have learned that natural convective processes are responsible for transporting trace chemicals to the upper atmosphere where they can adversely affect ozone levels. We see the role of NO_x in ozone chemistry is slowly being ascertained through modeling and more accurate measurements.

Our measurements indicate that the level of carbon dioxide, often implicated in atmospheric warming, is now rising at approximately 1.5 parts per million per year. Recent research indicates that other trace constituents such as chlorofluorocarbons, nitrogen compounds, and so on, may also be contributing to the greenhouse effect.

Finally, let me just make one comment with respect to a satellite activity which I know is of interest to this committee, and this is with respect to the commercialization of satellite operations.

The Cabinet Council on Commerce and Trade has been carrying out an extensive analysis during the past year of the transfer to the private sector of the civil operational remote-sensing satellites. Our information is that at this time the President has not made a decision with respect to whether or not such transfer will take place. We expect that a decision will be made in the very near future.

There are many more things that I could comment on with respect to the achievements of NOAA and our hopes for the future. However, I believe that I will conclude my statement at this time, Mr. Chairman, and will be happy to respond to any questions that you or your committee members may choose to direct toward us.

Thank you, sir.

[The prepared statement of Dr. Byrne follows:]

STATEMENT OF DR. JOHN V. BYRNE, ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Mr. Chairman and Members of the Committee, I appreciate the opportunity to discuss with you NOAA programs and policies for fiscal year 1984.

I am glad to report that our knowledge of the fundamental interactions between oceans and atmosphere has been growing steadily in recent years and has begun to pay off. For example, temperature and precipitation estimates are now 85 percent accurate and five-day forecasts are as good as three-day forecasts were ten years ago. Seasonal climate forecasts are improving as well. Additional advances are clearly foreseeable over the decade ahead, and the organizational changes we have put and shall put in place will help ensure that NOAA exploits them to the fullest, and the lowest possible cost to the taxpayer. I would like to address our various programs in some detail, beginning with a major element, the National Weather Service.

National Weather Service

The basic objectives of the National Weather Service (NWS) are (1) to protect life and property from environmental hazards by providing all essential forecasts, warnings and advisories; and (2) to promote economic development by supplying private industry and government agencies with timely weather and climate services. There are significant opportunities to improve the quality of these services with new technology and science programs, especially in reducing weather-related loss of life and property damage.

With recent technological advances in radar, geostationary satellites, automatic weather and hydrological observations, and remote sensing systems, a firm technical base exists for major advances in observation techniques. New integrating and processing systems will allow us to interpret this data and use it in near-realtime. Dissemination of warnings to the public can be expedited through development of voice synthesis systems and information packages suitable for teletext systems; cable, satellite and conventional TV; radio; telephone systems and newswires.

NOAA is conducting a study to determine the most cost-effective way to operate the NWS. This contractual study will attempt to identify services and products that are inherently Federal in character, and determine where significant savings can be achieved by the year 2000 through automation, centralization of support activities and contract operations, consistent with the legally-mandated roles of NWS. Results will be available to NOAA management this summer.

NOAA's fiscal year 1984 budget request includes a number of items to the National Weather Service in adapting new technology to its operations. Of prime importance is Doppler radar which offers marked improvement over conventional radar for early and accurate identification of severe thunderstorms, especially tornadoes and squall lines. Doppler radar can increase average warning lead time for the larger, more destructive tornadoes from the current one or two minutes to as much as 20 minutes.

NOAA proposes an increase of $5.7 million to continue a joint agency (NOAA/Department of Defense (DOD)/Department of Transportation (DOT)) program for development of common doppler weather radar capability. This new technology will improve severe weather short-term forecasting, reduce losses of life and property by improving distribution of severe weather and flood warnings, and replace obsolete radar equipment that will be nearly 30 years old by the time the Next Generation Weather Radar (NEXRAD) becomes operational. Corresponding budget increases are being requested by both DOD and DOT. The joint program ensures that the shared system will be more economical in both initial procurement and operational support than three separate programs unique to each agency. Together the increases proposed by the three agencies will fund a constrained and limited continuation of the validation (i.e. development) phase of the program.

In the meantime, NOAA proposes to achieve substantial savings in the fiscal year 1984 time-frame by streamlining NWS management and operations structure. These proposals include consolidation of the four coterminous NWS regions into three managerial areas of responsibility, for a savings of $1.2 million (managerial and operational effectiveness will be maintained by augmenting the central and Eastern Regional Headquarters staffs), and by consolidation of the Pacific and Alaska Regions, generating a savings of $407,000 through reduction in functions and staff at the Pacific Region Headquarters in Honolulu, Hawaii; elimination of regional hydrologists at each of the Headquarters offices in the four coterminous regions, for a savings of $580,000; and reduction in community liaison services beyond basic public warning and forecast services for an overall savings of $4.069 million.

In recent years private-sector meteorological services have expanded tremendously. NOAA proposes to save $1.036 million by terminating dedicated agricultural fruit-frost and fire-watch services. They benefit only specific user groups, and some are now provided by the growing private meteorological industry. NOAA will continue to disseminate generalized public service weather forecasts to support agricultural and forestry operations. No general station closings or reductions in hours of operation are proposed. A reduction of $1.5 million will be accomplished by curtailment of equipment and techniques research and development activities.

Successful demonstration of the Automation of Field Operations and Services (AFOS) system has enabled NOAA to accelerate plans for phaseout of absolete teletypewriter and fascimile systems for NWS field offices, thereby generating savings of $2.5 million as early as fiscal year 1984. Other communications support will be reduced $1 million through management and equipment reconfiguration. Centralization of preparation of aviation area forecasts through an automated system at the Kansas City National Severe Storms Forecast Center will enable us to reduce funding by $350,000.

Additionally, NOAA proposes a reduction in the level of engineering activities at the National Data Buoy Center located at Bay St. Louis, Mississippi, for a savings of $574,000. In support of the Administration's policy to redistribute the burden of Federal services from the general, tax-paying public to special user groups, NOAA also proposes a $525,000 decrease in funding of NOAA Weather Wire Services (NWWS) to new subscribers. Plans are underway to close our Sterling, Virginia operation and transfer its instrument testing functions to NDBC. All of the proposed cuts are consistent with maintenance of NWS operations and ensure Congressionally mandated environmental warning and forecast services.

National Climate Program

The National Climate Program Act, Public Law 95-367, was enacted by Congress in 1978 to establish a comprehensive, coordinated national approach to climatological research. In the past five years, we have organized a program that is definitely gathering momentum—improving our understanding of climatic processes, providing useful information and bringing us closer to the day when we can anticipate and respond to changes in climate. We will be submitting legislation to reauthorize the program to maintain this momentum.

In the past year, I have made changes in the organization and leadership of the National Climate Program Office (NCPO). The office is now located in the Office of the Administrator, and the Director, Dr. Alan D. Hecht, reports directly to me. These changes recognize the national importance of the program and strengthen interagency coordination and planning. The Office is staffed by personnel from NOAA, USDA and NASA.

The NCPO is responsible for three activities specifically mandated by the Climate Act: experimental climate forecasting, federal/state cooperative studies and measures for increasing international collaboration.

The Experimental Climate Forecast Center at Scripps Institution of Oceanography was established in 1981. Since then experimental seasonal forecasts have been made of temperature and precipitation using various forecasting methods, the most promising of which will be transferred to the National Weather Service for possible application. Potential real-world applications of climate prediction have already begun to attract substantial business and industrial interest. Thus, the NCPO has proposed that another university-based Experimental Climate Forecast Center be established and initially be jointly supported by industry and government. Several meetings with leaders of industry and business are being held to discuss future collaboration.

In 1980, at the request of NCPO, the Climate Board of the National Academy of Sciences established a panel to assist NCPO in developing a program for federal and state cooperation in climate studies and advisory services. The panel's report, "Meeting the Challenge of Climate," was published in 1982 and recommended that NCPO take a lead role in developing a coordinated, nationwide system of climate services embracing both public and private sectors. Mechanisms to achieve such a system will be addressed in at major national climate conference next month.

The NCPO has been assigned responsibility for coordinating interagency participation in international climate-related activities, including the U.S. role in the World Climate Program of the World Meteorological Organization (WMO). The NCPO is working with several agencies in coordinating the first major effort of the World Climate Research Program, the International Satellite Cloud Climatology project. In addition, the NCPO is working closely with the WMO and the Oklahoma Climatology Survey of the University of Oklahoma to demonstrate the use of climate data with microcomputers, for possible application in less developed countries.

The 1982 Annual Report of the National Climate Program, now under review by the Policy Board, provides greater detail than I have time for in my testimony. However, I will discuss some highlights of the report because they show evidence of an effective, dynamic program.

Climate forecasting

The complexity of climate forecasting is evident in predictions made for the winter of 1982-1983. Last September and October several forecasters predicted record low temperatures for the winter months in the eastern United States. These reports gained wide public attention. However, the official forecast of the National Weather Service and the NCPO's Experimental Climate Forecast Center at the Scripps Institution of Oceanography successfully predicted above-normal winter temperatures for the area based in part on analyses of Pacific Ocean temperatures and precipitation patterns. NOAA is initiating a study of these changes through a new project called TOGA (Tropical Ocean Global Atmosphere) to begin in fiscal year 1984, that will probably become part of the World Climate Research Program.

The Mexican volcano El Chichon, which erupted a year ago and ejected massive amounts of ash and sulphurous gases into the stratosphere, is being closely monitored by NOAA and other agencies for possible effects on climate. In July 1982 NCPO began informally coordinating the exchange of El Chichon data among scientists in NOAA, NASA, NSF and the academic community. Current opinion holds that El Chichon did not affect this winter's weather but may contribute to a 0.3–0.4 degree centigrade cooling over the next several years.

NOAA has compiled and published the "Interim Climate Data Inventory," which has been installed in a nationally accessible on-line information retrieval system. A pilot operation has demonstrated that users with computer terminals can search the inventory from hundreds of cities just by making a local telephone call. In addition, NOAA prepared a special assignment, "U.S. Economic Impact of the Severe Winter of 1982," the latest in a series of reports that assess the effects of unusually intense or widespread meteorological anomalies. This assessment was extensively reported in the national media and is the first report that compared the total impact and economic elements of major meteorological events: i.e. the $8.2 billion 1982 winter, the $36.7 billion 1976–77 winter and the $18 billion 1980 heatwave. NOAA has major responsibility to implement the National Climate program and we request an authorization of $10,010,000 for fiscal year 1984.

Climate research

Climate research is entering an exciting new era. It has long been realized that major variations in world climates are caused by the oceans, but the mechanisms were not understood. Temperature fluctuations in the equatorial Pacific, known as El Nino events, which have been linked to anchovy diebacks, Russian wheat crop failures, and severe Eastern U.S. winters, are one key to climatic instability. At the present time, an El Nino event is in progress, resulting in the failure of the anchovy harvest, severe rains and flooding in northern Peru, and drought in parts of Australia. Our ships and planes are measuring atmospheric and oceanographic parameters, and our satellites are measuring temperature, rainfall and cloud movements, so this El Nino will be the best documented in history. We may learn enough eventually to be able to forecast major changes in climate.

Weather observation and prediction

NOAA Weather Observation and Prediction Programs in fiscal year 1984 will continue to develop new techniques and deliver new products to the Weather Service for use by operational forecasters. New observational capability developed during the last year includes: (1) a new airborne Doppler system for detailed observation of atmospheric events such as microbursts, which have been responsible for several tragic aircraft accidents (e.g. New Orleans), and (2) a vertical profiling system (Profiler) which can continuously monitor winds, temperature, and humidity and water vapor content at various levels. The Profiler system has important atmospheric dynamics research applications and may replace the radiosonde. Doppler radar is also being used to study the early development of severe convective storms, and clean-air Dopper wind mapping may give several hours advance storm warning.

New programs are being initiated to improve precipitation forecasts—the one parameter which has not improved significantly over the last decade. A combination of new observational techniques, process-related research, and numerical modeling will be focused on forecasting flash floods and heavy snow. The Prototype Regional Observing and Forecast System (PROFS) is preparing specifications for future regional forecasting stations; PROFS has demonstrated that the new observing tools—Doppler radar, Profiler, satellites, tighter networks of conventional sensors—can significantly upgrade newscasts of severe weather. Hurricane research will concentrate on improving tracking and intensity prediction. Better measurement of synoptic patterns, plus new understanding of basic processes and faster computers, will provide the basis for refined hurricane forecasts and warnings.

Weather modification

NOAA will complete the Nevada, North Dakota and Utah State-Federal programs mandated in the Continuing Resolution for fiscal year 1983, and physical cloud and precipitation processes will remain as an essential part of our research mission. NOAA will maintain the weather modification program established by Public Law 92-205 and represent the U.S. in weather modification programs of the World Meteorological Organization.

Solar terrestrial research and services

NOAA's Solar-Terrestrial program provides services such as forecasts, alerts and warnings of solar disturbances which affect electronic communications, electrical power-grids, the Alaska oil pipeline, air transportation, satellite navigation systems, space-shuttle flights, national defense command and control systems, and magnetic oil exploration surveys.

NOAA is proposing to phase out its solar-terrestrial program. Since NOAA itself is a small-scale user of solar-terrestrial services, the possibility of transferring these services either to DOD, NASA and/or private industry, the major users, is being explored. NASA and DOD are examining their solar information needs and costs. Following completion of this assessment and a review of industry's total use and costs, a final determination will be made as to the most efficient designation and/or financing of solar research and service responsibilities. Meanwhile, in collaboration with the Air Force, NOAA has developed a new algorithm for predicting Earth arrival time of solar-flare shock waves with a margin of error of only a few hours in a one- to three-day timeframe. NOAA will continue to collect and process space environment data sets in realtime and provide a reduced level (eight hours per day, five days per week rather than 24 hours per day) of forecasts and warning services to Federal agencies, industrial users, foreign governments and university researchers. Research to maintain quality control, design new satellite instrumentation and improve understanding of solar terrestrial processes will be eliminated.

Marine observations and predictions

NOAA's long-term research objective under this rubric is to develop techniques for forecasting conditions in the ocean environment to serve various coastal and offshore users. NOAA's data on ice processes, ocean and Great Lakes circulation, and sea-air interactions are the basis of improved ice, fish recruitment and climate forecasts; severe weather alerts and warnings; and marine resource planning. More detailed knowledge of sea-air interactions will produce more accurate storm intensification and storm-track predictions, and more accurate sea-state forecasts. Better storm-track predictions, and more data on ocean mixing will improve our forecasts of first-year fish survival and therefore outyear fish catches. A more sophisticated grasp of sea-air interaction will permit better forecasts of hurricane intensity and improved storm-surge models for coastal areas.

Marine pollution assessment

In fiscal year 1984, the study of particulate/pollutant interactions will be a major thrust of NOAA marine pollution assessment programs. Toxic organics, long-lasting substances, are being added to our waterways and oceans in increasing amounts. The processes of bottom deposition and resuspension and effects on lower aquatic food chains are not well understood. We intend to give prime attention to these processes.

A second major thrust is the study of trace metals in the marine environment. Our research indicates that metals are subject to various chemical and biological processes that transform them from pollutants to relatively harmless biological complexes. Study of metal interactions with organic compounds and with particulate matter, deposition of man-made contaminants at the water/bottom interface, and the physical and chemical transformation of pollutants will eventually permit us to make wise multiple use of the seas as a food and fiber source and as a repository for waste products.

General research and development

NOAA's air quality research will continue to study anthropogenic influences, including the monitoring of global concentrations of carbon dioxide, ozone, freon and other atmospheric constituents, as well as solar radiation. We will continue to measure the effects of El Chichon on atmospheric parameters, the natural sources and atmospheric chemistry of acid rain precursors, the transportation and deposition of air pollutants, and the interaction of trace compounds. Cross-section measurements are critical in modeling the chemical processes underlying air pollution.

Acid Rain is a continuing issue of both public and scientific interest. Biological sulfur compounds have been measured in both the Atlantic and Pacific Oceans that could act as precursors of precipitation acidity. These findings help explain relatively high acid concentrations at remote sites such as Australia, Hawaii and the Southern Indian Ocean. However, the natural and anthropogenic origins of acid rain are complex; more research must be undertaken before regulation is attempted.

We have learned that natural convective processes are responsible for transporting trace chemicals to the upper atmosphere where they can adversely affect ozone levels. The role of NO_x in ozone chemistry is slowly being ascertained through modeling and more accurate measurements.

NOAA measurements indicate that the level of CO_2, often implicated in atmospheric warming, is now rising at approximately 1.5 PPM per year. Recent research indicates that other trace constituents such as chlorofluorocarbons, nitrogen compounds, methane and ozone may also contribute to a greenhouse effect.

Severe convective storms continue to cause heavy loss of life, property and commerce, but new data on coupled convective storms have been transformed into better forecasting tools for the Weather Service. For example, exchange meetings and exceptionally high quality severe-weather forecasts were provided vis-a-vis the August 13, 1982 flash floods in Kansas City.

The Subtropical Atlantic Climate Studies (STACS) program seeks to understand the role of the North Atlantic Subtropical Gyre, an ocean circulation pattern, in the heat balance of the Earth. The near-term focus is on development of an economic methodology for monitoring the Florida Current (Gulf Stream) over extended periods.

NOAA scientists participated with researchers from several universities in a local topography experiment demonstrating that fluctuations in the oceanic thermal field over hundreds of kilometers can be deduced from the velocity of low-frequency acoustic transmissions between moored arrays.

Commercialization of satellites

The Cabinet Council on Commerce and Trade has been carrying out an extensive analysis of transfer to the private sector of the civil operational remote sensing satellites. The analysis has been completed and a decision by the President is imminent.

The analysis has been motivated by the realization that successful transfer to private industry would reduce that size and scope of Federal activities, expand the private sector economic base of the country, and expand the market for space remote-sensing data.

A number of private entities have expressed interest in assuming responsibility for civil space remote-sensing systems—both land and weather. The Government provides a steady market for weather data. The market for land satellite data is growing, but has been hampered by the inherent limitations of a Government entity in market development and exploitation. The long-term outlook appears good—provided that an aggressive private sector entity, or entities, is given the opportunity to develop and expand the market base for this product. The Administration is firmly committed to enhancing opportunities for the private sector in space.

Mr. Chairman, this concludes my statement. I will be happy to answer any questions you or the Members of the Committee may have.

Mr. **Scheuer** [acting chairman]. Thank you very much.

Because we seem to have a good turnout of members this morning, we will operate under the 5-minute rule.

Dr. Byrne, what is your estimate of the size of the proposed R&D cut in the fiscal year 1984 budget proposal? As a subset of that question, why is it that R&D absorbs such a disproportionately large share of the budget cut for fiscal year 1984?

Dr. **Byrne**. I have a number of colleagues with me, Mr. Chairman. I would like to introduce those at the table before I respond to the question.

Mr. **Scheuer**. Very good.

Dr. **Byrne**. Then I would like to call, as the occasion permits, on some of my colleagues who are seated behind us.

At my right is Dr. Anthony Calio, who is Deputy Administrator of NOAA. On my left, my far left, is Mr. James Winchester, who is the Associate Administrator of NOAA; and directly adjacent to me on the left is Mr. James Smith, who will assist in responding to questions of a budget nature.

Mr. **Scheuer**. Why don't you invite any colleagues in back of you to join you at the table? Introduce them now and they will be free to participate.

Dr. **Byrne**. I might make the table a little bit crowded. If we can do this as the questions require, I would be pleased to do that.

We have brought with us the Assistant Administrators, in some cases the Deputy Assistant Administrators, of each of the services that I mentioned earlier, as well as the Acting Assistant Administrator of the Office of Oceanic and Atmospheric Research.

Inasmuch as your question is a specific one with respect to our research budget, I would ask Dr. Ostenso, who is the Acting Assistant Administrator for Research, to respond to the specific questions, and I will handle the general aspects of it.

Mr. **Scheuer**. All right. While he is coming up to the table let me ask you this: Why has it been that, like EPA, you have been without an Assistant Administrator for R&D for the past 2 years? Why do you have to introduce him, in the second half of this administration, after more than 2 years, as Acting Assistant Administrator for R&D?

Dr. **Byrne**. There are a number of answers to that question. In the particular case of Dr. Ostenso, I believe his desires, and he should speak for himself on this, in the long term are in other areas within NOAA.

Mr. **Scheuer**. That may very well be good, but our desires up here on the Hill, as expressed many times before, are that we get an Acting Administrator. You select somebody, send his name up to the Senate, let the confirming process go through, and we do away with the acting and have an Assistant Administrator for R&D. If he is not interested in taking that job, God bless him in all of his future options, and I hope he is happy and successful and healthy, but we have our mission and you have your mission.

Dr. **Byrne**. Yes, sir.

Mr. **Scheuer**. Why have you let his personal, perhaps, disinclination interfere with doing your job?

Dr. **Byrne**. I do not believe we have let it interfere.

Mr. **Scheuer**. Maybe there are some other reasons why you have not sent up a name to the Senate.

Dr. **Byrne**. It has not been without effort that we have been seeking to find another individual who would head up——

Mr. **Scheuer**. Wait a minute. It has not been without effort?

Dr. **Byrne**. We have been trying to find someone to fill the position.

Mr. **Scheuer**. Do you think perhaps the constant and systematic reduction of funding for R&D has made that job of finding another individual a little bit more difficult, if you are letting the whole scientific community know that you are degrading the importance of R&D in the agency on a continuing and systematic way? Could that possibly be inhibiting some of the better minds in the field from taking on this job? May that be compounding the difficulty you are having in finding the right person, so that you can remove that word "acting?"

Dr. **Byrne**. The way you phrase the question, I would have to say yes.

Mr. **Scheuer**. Why don't you tell us yourself what the effect has been——

Dr. **Byrne**. I understand that. I don't——

Mr. **Scheuer**. Wait a minute. Don't interrupt me.

Why don't you tell us yourself, in your own words, any inhibiting factors which you perceive to be having an effect on your talent search of this systematic reduction in R&D authorizations and appropriations, the systematic reductions in your budget request for funding for R&D? Tell us in your own words. You can rephrase the question, if you wish.

Dr. BYRNE. I don't really have a sense that the reductions that you are referring to have been a major deterrent. As you, yourself, indicated earlier, NOAA is an agency which has performed in a responsible manner in the past. It is an agency which does exciting things. It is an agency which is involved in interesting research, in both atmospheric and oceanic activities.

The degree of difficulty we have had in finding someone to fill this position is something which I personally don't understand. I find it a very exciting agency to be associated with. I would have to judge that our salesmanship in attracting people from outside Government to take the position as an Assistant Administrator leaves something to be desired.

Mr. SCHEUER. Let me interrupt you right there. I join with you in finding the mission of your agency enormously exciting, and I am happy that you feel that way. Perhaps that is the reason why you are held in such high esteem and great respect by the Members of Congress, especially the members of this committee. We know that you care deeply about the work of the agency and are excited about it, but let me assure you that your failure to find the right quality of individual to take over the Assistant Administrator, R&D, has nothing to do with salesmanship. The scientific community does not have to be sold a phony bill of goods. This is not a sack of potatoes. It is not one of those fancy dresses you find in the boutiques that needs fancy advertising in the New Yorker magazine.

The scientific community would be excited, just as you are, just as we are, about this job and there would be plenty of highly talented men and women who would leave better paying jobs in the private sector to take on that job of Assistant Administrator for R&D if they thought that our Government was respecting the R&D function and our Government was supporting and enhancing the R&D functions in the ocean environment.

Just reading through your mission presents the most mind blowing potential for enhancement of knowledge that is going to improve the quality of life of 4.4 billion people on this Earth. That is a truly exciting prospect.

You have that spark of excitement. We know you do. We respect and love you for it. We do or we would not be sitting here.

There are many Members of Congress here today. This is a large turnout here today. Many Members have other important committee chairmanship responsibilities, such as my distinguished colleague, George Brown, and my distinguished colleague, Tim Wirth. They are chairmen of other very important committees of the House; yet, you find them here today.

The reason you have not been able to get an Assistant Administrator has nothing to do with salesmanship. It has a lot to do with their perception of this agency, just as at EPA, of systematically reducing the importance of the status and the stability of the continuity of your R&D functions.

We are very much disappointed.

I have used up my 5 minutes. I will get back to the question about the R&D cuts and why R&D assumes such a disproportionately large portion of your budget cuts. I will get back to that on the second round of questioning, but now, out of respect for my colleagues, I am going to recognize my distinguished colleague from California, Congressman George Brown.

Mr. **Brown**. Dr. Byrne, I am pleased to see you here this morning. I will not reiterate the high regard I hold for you and the members of your staff.

I want to ask you two or three questions.

One, I am obviously quite pleased at the report you give on the national climate program office and what it is doing. I have followed that for some time, and it seems to me, from what you are saying, that we have gotten over our hurdle here and that we may look forward to steady progress in the role of that national climate program office and in the functions which it performs. Am I correct in this or do you see any obstacles down the road that need to be given attention?

Dr. **Byrne**. I am sure there are obstacles down the road, but I share with you the enthusiasm for the climate program.

We have made some changes during the past year. Dr. Allen Hecht, who is here, was appointed to the position of Director of the national climate program office.

In the reorganization of NOAA, because we regard climate as particularly important and because we regard it as a program that involves ocean and atmosphere as well, we elected to have the national climate program office report directly to me as Administrator of the Agency.

I am sure there will be problems. However, for the coming year we see some of the increases in our budget being directly focused on our climate activities.

Mr. **Brown**. The National Climate Program Act, as you know, is intended to help to establish the comprehensive framework of an interdepartmental nature for the kinds of activities that are prescribed. There are many similar broad ranging systems problems, not just long-range problems, that require in some ways a similar approach.

One of them might be this coordinated weather Doppler program. I don't know. I don't know enough about the Doppler, but you indicate that this is a program involving NOAA, DOD, and NASA, if I am not mistaken. Is that right?

Dr. **Byrne**. No. NOAA, the Department of Defense, and the FAA, as part of the Department of Transportation.

Mr. **Brown**. The FAA?

Dr. **Byrne**. Yes.

Mr. **Brown**. Have you run into any problems with the planning and management of that system, so as to provide a comprehensive national information source based on the Doppler data?

Dr. **Byrne**. Dr. Hallgren, the Director of the Weather Service, is directly involved with that. He indicates that we have not had any particular problems.

Mr. **Brown**. In other words, you have been able to get together with the FAA and DOD and agree on financing, distribution, analysis, networks, all the things that enter into a complex system such as that?

Dr. **Byrne**. Yes. I think it is an excellent example of cooperation that can take place between agencies of the Federal Government.

Mr. **Brown**. You have done it without even having any congressional guidance.

Dr. **Byrne**. We have been aware of the congressional interest in this program and have appreciated such interest.

Mr. **Brown**. That is a very good answer.

Let me go on to another subject because there are many members of the committee very much interested in it, and that is commercialization of the Landsat program. You devoted a whole page to that. We appreciate it very much.

What I am afraid is happening here—and I will ask a rhetorical question at the end of this comment—is that the administration, for its own reasons, philosophical and otherwise, is proceeding full steam ahead to seek to spinoff this R&D program, which in my opinion is not even operational fully yet, spin it off into a private commercialization for reasons of budgetary savings and some misbegotten perception that private enterprise can run the system. They are going to spring it full-fledged on the Congress, and we are going to have very little, if any, chance for input into the policy aspects of it, the long-range implications of it, or anything else. This could happen next week, as far as I can tell.

Is my perception correct or is there some other motivation behind what is going on?

Dr. **Byrne**. If there is motivation, it is a motivation which exists with respect to many of the things that the Federal Government has been doing, and that is to look to those programs that could be transferred to the private sector for operation with Government control to insure that the users receive the type of service which is needed. Any motivation beyond that is unknown to me.

With respect to Congress being surprised by the activity—and that is my word, sir—I am sure that the interest which exists within Congress will be manifested by a number of hearings and that many of the policy implications and the problems and opportunities associated with such a transfer will be made public.

Mr. **Brown**. Let me give you my assurance that, from the standpoint of one Congressman, I will make every effort to make sure that we are fully involved in consulting on the policy implications. I suspect there are other Congressmen who feel the same way about it.

I would like to request—and it may be premature to do so—that this committee be supplied with the documentation that underlies the studies that have been going on in the administration at the present time. I do not know whether you are in a position to even respond to that.

Dr. **Byrne**. I think I can respond that there have been a number of studies made during the past several years, which I am sure, when a decision is made, if the decision is made to proceed in the direction of commercialization, those analyses will be made available. It would, in my judgment, be a mistake to go through a reanalysis, a restudy, of all the studies that have already been made. Therefore, I would assume that at least the bulk of that material would be made available at that time.

Mr. **Scheuer**. Will my colleague yield very briefly?

The importance of our getting this information is that we do not want to be faced with a fadeout completely. There is no point in our getting the studies after the decision is made.

If it does not have to come to Congress for ratification, that leads to the question, can you effect this changeover, this commercialization of the satellite system, without legislation? Can this be done by the initiative of the executive branch alone?

Dr. BYRNE. I do not believe it can be done without legislation. Certainly, it is not contemplated to be done without legislation at this time, to my knowledge.

Mr. SCHEUER. Could you find out for us—we would like to have some formal assurance that no attempt will be made to effect this measure of policy change without coming to Congress.

Mr. BROWN. Would the gentleman yield?

Mr. SCHEUER. Just let me get an answer to this question.

Dr. BYRNE. I am reasonably confident we can make that assurance at this time, that there will be legislation required, that it involves the transfer of property from the Federal Government to a private operator.

Mr. SCHEUER. Would a long-term lease, a 99-year lease or a 25-year lease, require the approval of Congress?

Dr. BYRNE. We don't know what the mechanism is that will be used.

Mr. SCHEUER. Dr. Byrne, why don't you check it out and then come back and give us unequivocal assurance that Congress will be involved, that there will be a legislative request to effect this major policy change.

I thank my colleague.

Mr. BROWN. If I may continue briefly, Mr. Chairman——

Mr. SCHEUER. My questions are not on your time.

Mr. BROWN. I have the distinct impression that not only would the administration go ahead without specific congressional authorization, but they might go ahead in the face of specific congressional prohibition if they thought they could get away with it. It would not be the first time.

Speaking of giving away Federal property, the Department of Agriculture is about to start giving away several billion dollars of Federal property, namely, the CCC stocks of grain, to private farmers as a part of their PIK program. They are doing it without specific congressional authorization. I think the same thing could happen here.

The fact is that by legislation last year we asked you to provide us with a study the first of last month, which has not yet been provided, with regard to this matter. Am I correct?

Dr. BYRNE. That is correct, sir. We are remiss in not providing that. It is prepared. In view of the imminent decision, which we believe would have been made by this time, at the last minute we attempted to fine tune the report so that it would not be out of date as a result of a decision, and that has caused a delay.

Mr. BROWN. My understanding of fine tuning is you are going to make it conform to the decision that is finally made; is that right?

Dr. BYRNE. We will still meet the requirements of the law. My understanding is, when I say the report is about ready, one of the things I have discovered is that things always take longer in the

Government than you anticipate they will, but we anticipate that the report will be out this week.

Mr. BROWN. We look forward to getting it.

Dr. Byrne, inasmuch as I now have to assume the chair, I have to give up this opportunity to heckle you and let somebody else do it.

Mrs. SCHNEIDER. Don't look at me.

Thank you.

Inasmuch as I have four or five questions, I will begin immediately.

I welcome you to the committee.

I have had the opportunity to review the budget, and many of my questions relate to the whys and wherefores.

I would like to begin with NACOA. Some time ago Congress mandated that NACOA be established. A number of different critiques have come out, however, about the weather services and various satellite systems, and some of the reports have been rather critical. I notice at the same time that this particular budget is recommending the elimination of NACOA. I wonder if you could tell me why they are eliminating it.

Dr. BYRNE. If I could, I would like to transfer that question to Mr. Winchester. Mr. Winchester, as Associate Administrator, is the direct contact with NACOA for NOAA. Jim has been involved with NACOA and is well versed in the philosophy, and so on.

Jim.

Mr. WINCHESTER. Thank you, John.

Mrs. Schneider, as John said, I have been working very closely with NACOA, and we certainly recognize that NACOA has some competent people sitting as an advisory group, but there are many other advisory groups within the Federal Government that we have access to.

Mrs. SCHNEIDER. Excuse me. I am having a difficult time hearing you.

You have some other groups that advise——

Mr. WINCHESTER. There are many groups within the Federal Government or associated with the Federal Government that we have access to, so I believe that we feel that the extra cost of having a special advisory group like NACOA, as far as NOAA is concerned, is not really cost effective for the information that we get from them.

Mrs. SCHNEIDER. You are saying it is duplication of information that is already being provided to you from other commissions, councils, or whatever?

Mr. WINCHESTER. From the point of view of NOAA.

Mrs. SCHNEIDER. Can you name some of those other commissions or councils that are advising you?

Mr. WINCHESTER. We certainly have the National Academy of Sciences. We have the National Research Council. We have the Marine Board. We have various other——

Mrs. SCHNEIDER. What is the Marine Board?

Mr. WINCHESTER. It is part of the National Academy of Engineers. Some of us have membership on those various advisory groups.

I think that the only thing that I would offer in terms of NACOA is that the advice that they give is certainly much more extensive than we have funds to implement the programs. I guess in the final analysis we feel that it is an expense that we can dispense with and still get as much advice and counsel as we need. If we have to cut funds some place, this appears to be a reasonably good place to do it.

Mrs. SCHNEIDER. If I understand you correctly, you are making two points. One is that you are already obtaining adequate information from other sources, other councils, other boards, or whatever, and you do not need NACOA's information. Second, you are saying that the recommendations that NACOA has been making are too extensive for you to implement. In other words, they are giving you bad information that cannot be used.

Mr. WINCHESTER. I do not know if it is bad information, but they are giving us more advice than we can possibly use and implement, and most of their reports have been very general with no priorities attached to them. Therefore, it has not been that beneficial to NOAA.

Mrs. SCHNEIDER. How many reports has NACOA provided you with since its inception?

Mr. WINCHESTER. I do not have an exact number.

Mrs. SCHNEIDER. How about since you came into——

Mr. WINCHESTER. I would say on the order of four or five within the past year or so. One has been on the National Weather Service. I believe they did a report on the Coast Guard.

Mrs. SCHNEIDER. In all of those studies that they have provided to you, after the first or the second study that they gave you, you did not respond back and say, "These are too general. Where are the priorities?"

Mr. WINCHESTER. Yes; we have. We have mentioned that.

Mrs. SCHNEIDER. But they have not listened to you; is that right?

Mr. WINCHESTER. I guess there are other people contacting NACOA, too. They have not heeded our suggestions that from the point of view of NOAA their reports have been too general and too broad to do us much good in the way of setting priorities for our programs. However, you have to know that they also made quite an extensive report on the Coast Guard. Maybe the Coast Guard is very interested in that report, but from NOAA's point of view we are not particularly interested.

Mrs. SCHNEIDER. Thank you, Mr. Winchester.

I have another question which has to do with the fluctuations in the budget proposals for satellite activities versus ocean research, for example. I, too, share some of the feelings that have been expressed here already on the committee insofar as the research dollars in the ocean area being severely diminished.

I am also curious to note that the budget figures that we have been given for the satellite program, for the atmospheric program, the largest increase is to accelerate developments for the next generation of radar, and some of the largest decreases have come in the agricultural weather, fruit-frost, and aviation area forecast programs, which are proposed for termination, and also the fire weather program, which is proposed for reduction.

In my very novice state, I have a tendency to think of atmospheric programs—I try to think, well, what do you use atmospheric programs for? What is their work? I would think that one of the most valuable products that we could get out of our atmospheric program would be to provide farmers with information or orchardists with information about the weather and also the same thing having to do with fire.

I am concerned about what appears to be the priorities and increases and decreases in the atmospheric program, and I am just wondering how much of the increases are actually increases for defense use and for the Defense Department.

Dr. BYRNE. The increases with respect to Nexrad really are not specifically related to defense needs. The Doppler radar system involved with Nexrad gives us the capability in prediction for severe weather that we do not have on an operational basis, although we have been able to demonstrate through a prototype that this advanced system is significantly better than our present system.

With respect to the decreases that have been proposed for agriculture and fire weather, the philosophy, the policy, here has been to identify those programs which could be picked up by the private meteorologists and, using the fundamental data which the Weather Service will continue to obtain, the fundamental observations, the fundamental regional predictions, and so on, to use that information by private meteorologists in such a way that they can provide the kind of service that has been provided in the past with respect to agriculture, fruit frost warnings, fire weather, and so on, using private meteorologists. That is the rationale in making those reductions.

Mrs. SCHNEIDER. That sounds like a very good idea. Has NOAA conducted a study to see if that is feasible, being picked up by private meteorologists?

Dr. BYRNE. The direct answer to that question is no, there has not been a systematic study. There have been considerable discussions with private meteorologists. Inasmuch as this is the second year around on this proposed cut, the private sector is well aware of the intent in this direction.

Mrs. SCHNEIDER. My final question has to do with ocean dumping. I think we all recognize the increased pressures that are being put on our coastal areas—everything from offshore oil developments to the development of coal exports and a broad spectrum of other activities. I really am concerned that there is a proposed elimination of approximately one-half of NOAA's ocean pollution research that we are discussing now. I am just wondering if you could comment on your philosophy there.

Dr. BYRNE. The reductions that are taking place in, let's call it, the ocean dumping area, for the most part they focus on those studies which are regional in character. We recognize that in any activity involving research, whether it is regional or rather generic, that something will be learned. However, the intent was to continue our activity in fundamental processes that involve trace metals, that involve organic substances, and so on, and to move away from those activities which are of a more regional or more local aspect.

Mrs. **Schneider**. Most research monitoring, I would think, in the oceans would almost have to be regional for purposes of protecting our coastlines.

Dr. **Byrne**. Part of the problem that we foresee there is that for the Federal Government to do a study, the type of intense study that would be required by any community that might discharge into the ocean, at this time seems to be prohibitive until we have a better sense of what might happen.

However, we would work with the EPA as they begin to select areas for investigation and would attempt to provide whatever research backup we could in those areas.

Let me say one thing in general, however. We are concerned about the use of the ocean and about the accidents which take place in the ocean with respect to the addition of substances, toxic and otherwise. We have been undertaking, in fact during the past week, a review of all of the pollution-related programs within the agency to improve our focus on this, to insure that we have a complement of research effort and that we get the most mileage from our efforts.

I share your concern with respect to the importance of ocean dumping. It is an area that we are not ignoring. However, we are making adjustments in the program.

Mrs. **Schneider**. And reducing some of the funding.

The only thing that concerns me is that we not take a look toward the long range and that we have to spend more money at a later time for cleanup or for remedial purposes.

Thank you, Mr. Chairman.

Mr. **Brown**. Mr. Wirth.

Mr. **Wirth**. Thank you very much, Mr. Chairman.

Dr. Byrne, welcome again. When you were here last year, you were brand new to the job, and I guess you explored at some length the space lab, if you remember.

Dr. **Byrne**. I remember very well, Congressman.

Mr. **Wirth**. A year ago you proposed that the budget for the space environment lab, as I remember, was being cut from $5 million to $1.8 million, and the justification of that was that about $3 million over that budget was really, in effect, services for various users and that you were going to create a program whereby the users of the information coming from SEL would pay for the information. Is that correct?

Dr. **Byrne**. With one slight correction: Much of the reduction that was proposed last year was for the research activity that was associated with the service activity. You will recall that we had some discussion as to the exact numbers, and so on, but essentially your statement is correct.

Mr. **Wirth**. You were on then a 2- to 3-month time schedule under Dr. Lovack to develop a package of users who would pick up that additional cost for NOAA for SEL; is that correct?

Dr. **Byrne**. That is correct.

Mr. **Wirth**. What came of those negotiations that were to be completed in April of 1982?

Dr. **Byrne**. The continuing resolution and the continuation of the program—a different tack was taken. There is an interdepartmental committee on meteorological service and supporting research.

Mr. WIRTH. I am aware of that. They were going to do a report in April of 1982 as to what users would pick up these various costs; is that correct?

Dr. BYRNE. Yes, and they have been active and, in fact, have recommended that a subcommittee of that group, specifically the Space Environment Forecast Subcommittee, prepare a national plan for space environmental services.

Mr. WIRTH. You had told us, as I remember, a year ago that by April of 1982 you would have together the package to assure the funding for what are very important uses for some 70,000 commercial users—airlines, utilities, and communication services as well as the Department of Defense and NASA. That was to be done by April of 1982, if I remember your testimony correctly last year.

Dr. BYRNE. I don't remember that specifically, sir, but, nevertheless, let me follow this line of——

Mr. WIRTH. It is in the committee report on page 455.

I realize what you suggested earlier. As you said, I find that Government work always takes longer than we anticipate. I think you said that in response to a question of Mrs. Schneider.

Dr. BYRNE. That is my own observation.

Mr. WIRTH. This is about a year now to get this particular rationale for these cuts together. Obviously, Dr. Byrne, what I am concerned about is that you are at it again. You told us a year ago that in making these cuts from $5 to $2 million, those 70,000 users out there, you were going to put together the package of how the users were going to pay for these particular services.

Mrs. Schneider, a year ago, asked, "Are there user fees authorized in NOAA? If not, why don't you come back to this committee and ask us for the authorization to do that?" We did not hear anything from you on that. We are now almost a year after the fact, and we are back into the same cut, and now you are saying what we are going to do is cut research. Is that the basic justification you are giving us today? We have moved from services to research; is that right?

Dr. BYRNE. No.

Mr. WIRTH. No?

Dr. BYRNE. No. If I could encapsulate the situation as I understand it, last year we proposed eliminating the research activity, recognizing that the $1.8 million was not sufficient to cover the full service operation. At that time there was investigation with the other agencies to determine whether or not we could obtain the money, and they were not ready to come forward with it.

In the interim, the Congress elected not to adopt the budget we proposed but to include us on a continuing resolution, and so we continued that activity.

Also in the interim, the interdepartmental committee has been meeting. There has been the preparation of an issue paper addressing these issues, relative costs with respect to operating on a 40-hour-basis vis-a-vis the 24-hours-a-day, 7-days-a-week basis.

There will be a meeting in Rockville on March 9. The first draft of a national plan—a national plan—for space environmental services is forecast to be presented at that meeting. When the plan is approved by all agencies, including agreements, and so on, it will be forwarded to the Office of Management and Budget, as we are required to do. However, I assume that the activities of this committee are not confidential or secret, and we would be pleased to see that you obtain a copy of the report which is provided.

Mr. **Wirth**. I think that is one of the most wonderful two-step answers I have heard. On the one hand, we are cutting research; on the other hand, we are going to have a meeting related to who is going to pick up these services.

Let me try it again. If you go from the $5 million down to $2 million, are you cutting the basic services to a variety of commercial users or are you cutting research, or both?

Dr. **Byrne**. Both.

Mr. **Wirth**. Who, then, or what is going to happen to the airlines and the utilities and the communication services, and so on, who depend upon SEL? Where are they going to get their services, or aren't they?

Dr. **Byrne**. The intent at this time is to determine whether NASA and DOD—or DOD—or the private sector, or a combination of the three, can pick up, one, either the cost or the operation of that service——

Mr. **Wirth**. Got it. That is what was supposed to have been done last year, by April of 1982, was to determine who was going to pick up the cost of those and if they could.

Dr. **Byrne**. That is right.

Mr. **Wirth**. There is some very significant research that is available to NASA and to the Department of Defense, as well as to a lot of commercial users in the country. Now that package of users sharing of the burden was, from our discussion last year, to have been done last year. That has not been done yet.

Dr. **Byrne**. No; it was done. The conversations, the discussions with those agencies and users did take place, and no one was ready to pick up the cost.

Mr. **Wirth**. But they are now ready this year? You think they may be ready this year?

Dr. **Byrne**. We do not know whether they are ready this year. We will see, in accordance with the plan which comes out of this committee—it is our intent in the submission to OMB that we will see coordination across the agency levels so that the user agencies—and NOAA is a relatively small user—will be bearing the major portion of the cost.

Mr. **Wirth**. But there is nobody yet prepared to pick up these costs. Therefore, as you cut the budget, this function may well not get served; is that correct?

Dr. **Byrne**. We have proposed the budget reduction.

Mr. **Wirth**. I understand. What about the research side of this, Dr. Byrne?

Dr. **Byrne**. The research side, you will recall last year we provided you with some information with respect to the total research activity in this area. NOAA's involvement was very small compared to that of the other agencies.

We could again find that information for you, if you are interested in it. My recollection was that we were looking at a NOAA contribution of the order of $2 or $3 million, less probably, and that the total was—and you have the record in front of you—something of the order of $215 or $216 million of federally sponsored research in the solar terrestrial area.

Mr. WIRTH. Thank you, Mr. Chairman.

We are now finding where the services are going to be picked up—that is the same answer we got last year.

I guess, with you as scientists, I am surprised that all of you are supporting these dramatic cuts in research, which I do not think make any sense, either, but we will address that, I am sure, in the overall authorization.

Mr. BROWN. Mr. McCandless.

Mr. MCCANDLESS. Dr. Byrne, I am impressed with research and development, a~~nd I~~ think it has a place in all of these various governmental programs, but I come from an area that depends primarily on agriculture, and specifically agriculture in the sense of fruit-frost warning services and those kinds of things which, when properly implemented, provide a service and a safety that ultimately produces a commodity upon which the Government collects taxes because there is profit.

This is my first year, and last year was your first year, so maybe we can find some common ground.

I notice that you are proposing a reduction of 242 personnel in that field, and I have a concern that we are looking here into the future too fast without taking into consideration what we need to provide in the way of a level of service to those who pay our bills here in Washington and produce the goods and commodities that make it possible to pay our respective salaries.

Would you care to comment on that? I guess what I am saying is that I have not seen in the last years anything that appreciably replaces the accuracy with which our fruit-frost service people in the local areas are able to assist our farming communities. You talk about the new radar coming on line and other things.

Dr. BYRNE. I am not sure where you obtained the number on personnel reductions. I think the entire 242 is for the entire Weather Service and not solely for the agricultural aspects.

Mr. MCCANDLESS. It is Weather Service, but this comes under Weather Service, as I understand it.

Dr. BYRNE. Yes; but specifically with respect to the fruit-frost warning program and the agricultural weather service, we would anticipate a reduction of about 43 positions throughout the country.

Mr. MCCANDLESS. Do you have in place something that satisfactorily handles the level of service that this community of activity deserves from your Department that would give them the information they need in lieu of these people that you are suggesting be reduced?

Dr. BYRNE. This is the area that we would propose be picked up by the private sector, working in coordination with the Weather Service and also with respect, I think, to the Agricultural Extension Service.

Mr. MCCANDLESS. We talked here about the private sector. If I understand what took place prior to my questions, the private sector has not yet come into mesh with what it is they are going to be doing in the way of coordination. Is that a fair assessment?

Dr. **Byrne**. I think that is a fair assessment. I think it is a function of the fact that we have been operating at the previous level under the continuing resolution. There has been considerable discussion over this topic during the past year, since it was first proposed.

Mr. **McCandless**. Could I go back to my constituents who produce hundreds of millions of dollars in revenues for the Federal Government and say that we have a satisfactory substitute for the fruit-frost service as it is now administered?

Dr. **Byrne**. I would like to ask Dr. Hallgren, who is the Director of the Weather Service and who has been directly involved in this, to respond.

Mr. **McCandless**. I might add that it is not just my constituency. It is a sizable part of the State of California.

Dr. **Hallgren**. I am specifically addressing your fruit-frost forecast service. In that case, it is located in Florida, Texas, and California, although we do provide minimum temperature forecasts in other areas. There are private meteorologists working in all of those areas. Using our information—that is, our guidance to products, the basic forecasts that we prepare for the public—these people, through a concerted effort, could then, in turn, contract with the growers in that area and provide them specific minimum temperature-type forecasts; at least I believe they could once they see that that opportunity exists.

Mr. **McCandless**. What we are saying here is that, if I as a grower wish to continue with this information, under your proposal I would need to find one of these services locally and contract with that service to provide the service that for the past years has been provided by the Government? That is the direction in which you are going. However, what if there is no service in the area available? Then what do I do?

Dr. **Hallgren**. What I am saying is that private meteorologists are active in all of those areas and with contracts in other areas, and this would be another area that they would have to expand their horizons into. They certainly should be in a position to do so at a fee.

Mr. **McCandless**. The problem I have with this answer, and I do not want to sound argumentative because I am interested in developing this, is that your main weather service in Los Angeles is only about 125 miles away; yet, the lag time in the process in recent years has been such that the area has suffered from a lack of weather information that has substantially cost both the growers and people loss of revenues, loss of real estate, and yet we are told that, well, we have Los Angeles and they have all the information, and this is what it is. However, the weather comes and goes and we have flash floods and we have other problems that have caused tremendous losses, and then FEMA comes in and assists with other dollars to offset the losses. It seems to me as though the left hand is helping the right hand, but the right hand is saying, "Well, we are going to go ahead and do something else."

I am interested in trying to save some money, however futile that may be in this town in which we are living.

I have difficulty accepting at this point the direction in which I assume you are planning to go, but let me move, with the limited time I have left——

Mr. Brown. Your limited time is just about up.

Mr. McCandless. I understand you have a navy and an air force; is that right?

Dr. Byrne. We do not refer to them as such. We do operate vessels and aircraft, yes.

Mr. McCandless. According to the information I have, you have 25 ocean-going vessels and 8 aircraft. Is there a way that the services provided by those could be contracted with by the Navy and the Air Force, or a combination of both, or the Coast Guard, without duplicating the equipment and the personnel?

Dr. Byrne. I think in some cases there might be, however, not with respect to the vessels specifically. The aircraft is used for specific purposes. We do have aircraft which we use for research, flying into the eyes of hurricanes, and so on. We do involve the Department of Defense aircraft, as they also fly into hurricanes.

I guess the short answer to your question is no, not really, although there are other opportunities for augmenting our activities, for contracting out with respect to other research vessels, and so on.

Mr. McCandless. Thank you, Dr. Byrne.

Thank you for your patience, Mr. Chairman.

Mr. Brown. Mr. Andrews.

Mr. Andrews. Thank you.

I have just one question for you, Dr. Byrne.

Would you explain to us how the defense and civil weather satellites are divided? I understand they are separate. I am wondering if you would explain, if that is the case, why.

Dr. Byrne. There are a number of answers to that question, some of which are, no doubt, classified. I would like to refer that question to Dr. Calio, who has long experience in satellite activities.

Dr. Calio passes it on to John McElroy, who is Director of our National Environmental Satellite Data Information Service.

John?

You should all meet John McElroy, anyway. This is an opportunity for you to do so.

Dr. McElroy. There are, indeed, two weather satellite systems in polar orbit, one being operated by DOD and one being operated by the civil sector. The composite of those two systems meets both civil and military needs. It is not separate in the sense that they are uncoordinated or that they do not share data back and forth. They are two systems which operate quasi-independently but in times of stress on either system the opposite system steps in and provides the backup role. That works both for the defense to the civil and the civil to the defense. They are highly coordinated systems.

Mr. Andrews. Thank you. That is all I have.

Mr. Brown. Mr. McGrath.

Mr. McGrath. Thank you, Mr. Chairman.

I understand my statement was put into the record previously.

I really have no interest at this point in time in going over those things at a posture hearing which Chairman Brown and I are going to investigate fully with regard to the transfer of the Landsat technology. I do have one concern regarding the reprograming of the funds for the polar weather satellites. I would like to know from you what you consider the status of the reprograming to be. I understand a request has been sent forward. I sent a letter to Senator Laxalt asking him to deny that reprograming, and also to Congressman Smith in our House. I received a letter from Senator Laxalt saying that he would not approve the reprograming. I just thought perhaps you would maybe have some other answers.

Dr. **Byrne**. I think that answer is essentially correct. It was rejected without prejudice. I think your answer is on target.

Mr. **McGrath**. Thank you.

Mr. **Volkmer** [acting chairman]. I would like to get into the commercialization process with regard to both weather satellites and Landsat. I understand there has been some question with regard to that.

I would like to know, first, whether or not you have any time table which you are working on with regard to the commercialization process.

Dr. **Byrne**. At this time the decision has not come from the White House whether to commercialize or not. Therefore, we are waiting on that decision.

Mr. **Volkmer**. You do not have any decision from them as to commercialization of Landsat?

Dr. **Byrne**. I would like to ask Dr. Calio to respond to that, if you do not mind, sir.

Dr. **Calio**. Mr. Chairman, we do not have any specific time table with respect to commercialization of Landsat. The situation at the present time is that we have no funds to replace or provide future land remote-sensing satellites. The concept currently being implemented is that Landsat D-Prime will be flown in the 1985 timeframe and last through 1988. It appears to us that we should have in place, before the current Landsat satellites are expended, and allowing for certain time for development of future land remote-sensing systems, the capability within the private sector to take over that activity. Allowing 4 years for development of follow-on satellites, it would say that by the 1984-85 timeframe it would be appropriate for us to have the private sector configuration in place, but there has been no specification to us as to a timeframe or a schedule that we must keep in order to commercialize civil remote-sensing.

Mr. **Volkmer**. What about weather aspects?

Dr. **Calio**. The weather satellite aspect of it?

Mr. **Volkmer**. Yes.

Dr. **Calio**. No, there is no timeframe specified to us for that, either. It was being considered in conjunction with the land remote-sensing systems, in that some people think it would be appropriate to put these two systems together, that it would be in the best interest of the Government. Therefore, if the Landsat system would be the pacer as far as time is concerned, then the Metsat would be included along with that.

Mr. **Volkmer**. How much time, money, and personnel are presently being employed in the study of commercialization?

Dr. **Calio**. Excuse me just a minute.

[Dr. Calio confers with his staff.]

Dr. **Calio**. I will have to provide that for the record, Mr. Chairman.

Mr. **Volkmer**. All right.

Dr. **Calio**. I do not know the number offhand.

May I provide that for the record?

Mr. **Volkmer**. Yes, I would like to have that.

[Material to be supplied follows:]

An in-house review of the commercialization issues has just been completed. This effort involved about 10 people for a total time of approximately 1 staff year. The labor value was $45.1K and $3.0K was expended on printing and materials. In addition to this, three commercial studies are underway. These studies are being done by (1) National Academy of Public Administration at $140.1K, (2) Earth Satellite Corp. at $89.4K, and Econ, Inc., at $93.6K. The total value of all of these items is $371.2K.

Mr. **Volkmer**. The second thing is, as I understand it, Chairman Scheuer asked about legislation, and you indicated that you would have to submit legislation; is that correct?

Dr. **Byrne**. That is our understanding. Again, I think Mr. Scheuer requested that we obtain a definite answer on that. We indicated that we would provide that.

Mr. **Volkmer**. My next question is, would you be submitting the legislation prior to making a determination to commercialize or after making that determination?

Dr. **Byrne**. The fundamental decision would be made at the White House with respect to whether we should proceed in the direction of commercializing. During that process, legislation would be drafted, presumably in conjunction with activities here on the Hill.

Mr. **Volkmer**. The others I would like to ask you about are these: What are the present operating costs for the land remote-sensing system? Does anyone have that?

Dr. **Calio**. It is approximately $35 million.

Mr. **Volkmer**. That is an annual cost?

Dr. **Calio**. That is right, sir.

Mr. **Volkmer**. And for the weather system, what are the operating costs?

Dr. **Calio**. $46 million.

Mr. **Volkmer**. Has there been any study or proposal at all as to separating the ground operations from the satellite operations?

Dr. **Calio**. I do not quite understand your question, Mr. Chairman.

Mr. **Volkmer**. All right. My question is, have you studied at all, with regard to commercialization, the possibility of commercializing only the ground part and not the satellite part?

Dr. **Calio**. There has been no detailed analysis performed. However, there has been a recommendation that has been forwarded by the Landsat advisory committee that would consider separation between the flight system and data acquisition part, and the data processing and distribution part.

Mr. Volkmer. Dr. Byrne, in your statement you say that the market for land satellite data is growing but has been hampered by inherent limitations of a Government entity in market development and exploitation.

What are the inherent limitations?

Dr. Byrne. I think there are several, Mr. Chairman.

One of them has been an uncertain availability of satellite data; namely, the future of a Landsat D system, the current system. There has been a hesitancy on the part of the recipients of that data to make large investments because they did not know whether that data was going to continue for the future.

Second, there has not been, on the part of the Government as I know it, a major marketing activity looking for new applications. That is why it is felt that, with the private sector venture in this area of civil remote sensing, there could be a continuity provided by the private sector and an active marketing approach taken by the private sector to stimulate new applications of this data for an added value to industry, which we, the Government, have really not taken on from a marketing standpoint.

Mr. Volkmer. There are uncertain aspects of those marketing features even with a Government-operated program?

Dr. Calio. Some, yes.

Mr. Volkmer. Could you spin off some of the marketing features?

Dr. Calio. Sure, yes, you could.

Mr. Volkmer. Without spinning off the actual satellite control and information?

Dr. Calio. Yes, that could be done.

Mr. Volkmer. Who is the biggest user of the satellites?

Dr. Calio. The National Weather Service.

Mr. Volkmer. To what extent?

Dr. Calio. Ninety-five percent.

Mr. Volkmer. Some of us ask, why would we want to commercialize that and then buy it all back?

Dr. Calio. May I explore that for a minute?

Mr. Volkmer. Yes, go ahead.

Dr. Calio. I think the primary concern is, if you look at each of these different satellite systems by themselves—you asked earlier—the cost does not seem to be prohibitive. You asked the cost of operation of Landsat, and it is $35 million, and the cost of Metsat is $46 million. That does not include the replacement satellite cost, the acquisition cost.

If you look at the Metsat line, the meterological satellite line, for the next few years, it is budgeted out at about $200 million a year.

If you look at—and there is nothing in the budget right now—replacement satellite for land-observing systems, you are talking about $100 to $150 million per year.

If you go to a ocean-observing satellite, you are looking at replacement and operation costs, another $100 to $150 million a year.

If you put all those together, you have essentially a $500 million-a-year appropriation that is necessary to acquire and collect the data, process it and distribute it, in those three arenas—air, sea and land.

The concern is that as that continues to take place the taxpayers should not necessarily be the ones to be paying those costs. That is the gist of what is happening here. We are looking for an eventual reduction in Federal expenditures, and the question is, can you take this activity, which apparently has an added value, put it in the private sector, and gain a return for the investments that are made there, and reduce the expenditures as far as the Federal Government is concerned? That is the whole concept here, to try to shift the cost from the Government to the private sector, if, indeed, there is a return on the investment.

The question is that somewhere along the line that has to take place, and the question really is, when does it take place? This administration is trying to do it in a reasonable period of time over the next few years, to try to reduce the cost to Government for the operation, maintenance, and acquisition of these satellite systems. That is the general thrust. That is the concept.

It is not contemplated that there would be a cost savings in the first few years of private sector involvement. Indeed, the Government may have to support them in some way to get started, but in the long run it is hoped that these budget items can be reduced and a thriving business can be established. That is the concept.

There are a lot of open questions with respect to whether that can or cannot be done.

Mr. **Volkmer**. In the event that the White House comes down with a request to start proceeding toward commercialization, for either or both systems, how long would it take you to start it?

Dr. **Byrne**. To start?

Dr. **Calio**. Commercialize the process?

Mr. **Volkmer**. You would have to go through a process first. First, you are going to make a determination of how you are going to do it and what part of it to commercialize.

Dr. **Calio**. Precisely. The next step, then, would be to figure out how we are going to put it together and how we would go out to the private industry, how we would evaluate any concepts that we would bring forward, what legislation is necessary to actually allow those concepts to be carried forward. A 14-month time period is what we estimate for that process to take place.

Mr. **Volkmer**. Before you would be ready to commercialize?

Dr. **Calio**. Yes. That is assuming working in an interactive way with the Members here on the Hill, the Members of Congress, to develop the appropriate legislation that would be necessary. It could take longer than that if we had difficulties with the language of such legislation.

Mr. **Volkmer**. Some of us, especially this Member, have had some concern with regard to commercialization and the question of how many out there are actually prepared to commercialize. I would hate to see a monopoly of the weather satellites and only one in company control. We have other international aspects of Landsat; do we not?

Dr. **Calio**. That is correct. As a matter of fact, that would be another step that would take place. We would immediately establish an interagency working group to try to understand the constraints and the terms and conditions in which we would have to set up such an entity to be able to satisfy our international commitments, our national security considerations, et cetera.

Mr. **Volkmer**. My question is based on this: You alluded to the fact that we have a problem right now in the long term, especially on Landsat, the land sensor, because of where we are with our latest Landsat project. We need to make a decision as to whether or not we are going to have another land sensing satellite, do we not?

Dr. **Calio**. We have proposed to the Congress that we have sufficient funds to build and fly two Landsat D satellites, one in orbit right now and the other one currently being completed in fabrication.

Mr. **Volkmer**. That would only take us to when?

Dr. **Calio**. Under the best conditions, to 1988.

Mr. **Volkmer**. And, it would take 4 years to build a new satellite?

Dr. **Calio**. To build a new satellite?

Mr. **Volkmer**. To get it ready to get it up.

Dr. **Calio**. To design and build, about 4 years.

Mr. **Volkmer**. That is what gives us our problem, then, isn't it?

Dr. **Calio**. That is why I walked back from that. You asked me what the timetable was, and the timetable is really predicated on the lifetime of these satellites.

Mr. **Volkmer**. This 14 months gets you into a problem because the 14 months has not started yet?

Dr. **Calio**. That is right.

Mr. **Volkmer**. We are going to have a hiatus if 14 months starts, October 1—to make it easy, let's say it starts October 1 of 1983—because then you are going to be in the fiscal year 1985 before you can get any money and get it started.

Dr. **Calio**. If it goes forward as a Federal system, that is correct. If it goes forward——

Mr. **Volkmer**. If a decision is made to commercialize the ground but not the space part, the satellites, we are in a bind.

Dr. **Calio**. Say that again, please.

Mr. **Volkmer**. We are in a bind if the decision is made as far as the land sensing is concerned to commercialize the ground part but not the satellite part. Even if you go to private industry, how can a private one go ahead and design one faster than we can?

Dr. **Calio**. It is my understanding that some of those plans are going forward at the present time by industry, by some members of industry.

Mr. **Volkmer**. I think we have a problem.

I have used up most of my time already. I recognize the chairman of the committee.

Mr. **Fuqua**. If you were a farmer, Dr. Byrne, in Florida or Missouri, what kind of weather information would not be available under the reduction to the Weather Service in fiscal year 1984 that were available in fiscal years 1982 or 1983.

Dr. **Byrne**. May I ask Dr. Hallgren to respond to that?

Dr. **Hallgren**. First of all, what will still be available is all of the data collected for preparation of public forecasts as well as the public forecasts, extending out into the future, which are useful to anyone in any activity, including farmers.

What will not be available, of course, will be any forecasts that are specifically tailored or focused on any agricultural activities and focused on giving the weather information needed for the particular activity that is going on in that part of the year.

We will also not collect data associated specifically for agricultural purposes.

Mr. **Fuqua**. For instance, what would that be? What would that entail?

Dr. **Hallgren**. We do, through some of our agriculture weather service centers, collect data related to soil moisture or more detailed temperature information, et cetera. Also, at the four agriculture weather service centers we specifically put together information regarding the impact of the weather on the farming activities within those areas and for the season. That will not be available.

Mr. **Fuqua**. Therefore, generally the farmer, then, would be able to receive essentially what information he has been receiving with the exception of certain specified things which you say would be like soil moisture and maybe surface temperature?

Dr. **Hallgren**. He will get all the public forecasts that are still prepared from 0 days on out to 5 days, but he will not get the advisories and information that says, in light of your farming activity—because we generally know what is going on within an area—here are the critical parameters weatherwise.

Mr. **Fuqua**. What has happened, Dr. Byrne, to the university research program that you had? Has that been reduced or does it remain static?

Dr. **Byrne**. In the proposed budget, the portion of it which is referred to as sea grant program would be eliminated. We have endeavored, and in fact have carried out during the past several years a considerable number of different research-oriented programs, direct grant support in the atmospheric sciences and fisheries, and so on, which are not carried under the sea grant program. We also have a number of cooperative research institutes with a number of universities throughout the country which work directly with NOAA on research projects. These would not be affected, either.

The primary reduction would be with respect to the sea grant program.

Mr. **Fuqua**. Therefore, other than sea grant, then, there is no reduction in the university research?

Dr. **Byrne**. Not specifically, no, sir.

Mr. **Fuqua**. Mr. Bateman.

Mr. **Bateman**. Thank you, Mr. Chairman.

Dr. Byrne, some reference was made to some people would link Landsat and Metsat in the context of privatization or commercialization. Is there any document, report, or study or formal recommendation that these some people have advanced, or could you identify who these some people are?

Dr. **Byrne**. Following this line of questioning, I would like Dr. Calio to respond to any of these satellite questions. I would appreciate that.

Dr. **Calio**. The some people in this particular case is Comsat Corporation, and I think Comsat has submitted or has briefed various

Members of Congress, and some members of the staff. I think the documentation is available or has been made available.

Mr. **Bateman**. Inasmuch as they have not briefed me and I do not know how to call them, do you have a package of material that you could send to me?

Dr. **Calio**. How about if we arrange for Comsat to discuss that with you?

Mr. **Bateman**. I would be very happy to discuss it with them.

You mentioned a 14-month timeframe, should a decision be made to go forward with commercialization, and that includes a period within which Congress would presumably act to authorize it or modify the law so that it would be permissible for it to go forward?

Dr. **Calio**. That is correct.

Mr. **Bateman**. I take it from that, that the current view is that it could not go forward without congressional authorization or approval?

Dr. **Calio**. That is the general impression I have. I do not want to say that categorically because there may be——

Mr. **Bateman**. Some people may have another view.

Dr. **Calio**. That is right.

Mr. **Bateman**. Mr. Chairman, it is apparent that I share the interest of a number of members of the committee on this commercialization issue. Inasmuch as I understand the subcommittee is going to be dealing with it more specifically, I do not feel it is necessary for me to take up further time of Dr. Byrne and his associates this morning or my good chairman.

Mr. **Fuqua**. Did you have any further questions?

Mr. **Bateman**. No, sir.

Mr. **Fuqua**. Mr. Durbin.

Mr. **Durbin**. Thank you, Mr. Chairman.

Our background indicates that you are cutting your research and development funds in next year's budget by about 45 percent. I do not know if that figure is altogether accurate, but I am interested, Dr. Byrne, in a portion of your statement, and I will read from it, related to acid rain.

> However, the natural and anthropogenic origins of acid rain are complex; more research must be undertaken before regulation is attempted.

I take it from that statement that a part of the research funds which will not be contracted relate to acid rain.

Dr. **Byrne**. Let me make sure I have a correct answer for you.

[Dr. Byrne confers with his staff.]

Dr. **Byrne**. Actually, there is an increase in our acid rain research activity.

Mr. **Durbin**. For next fiscal year?

Dr. **Byrne**. We are proposing that for the next fiscal year.

Mr. **Durbin**. Have you reached any kind of conclusions yet based on evidence of previous research done as to the origins of acid rain?

Dr. **Byrne**. I think we are making considerable progress with respect to the natural origins, some of the natural origins of acid rain. As you probably are aware, there is a Federal program that assigns to a number of different agencies different responsibilities, and the responsibility assigned to NOAA is to pursue the natural precursors of acid rain.

The testimony which I did provide indicates, I think—and I summarized it earlier—the fact that we are finding evidence that certain sulphurous compounds are generated biologically in the ocean which can contribute to acid rain.

I think the answer, the short answer, to your question is yes, we are making significant progress with respect to understanding better the natural sources of acid rain.

Mr. **Durbin**. Have you been able to confirm in any kind of percentage the responsibility for acid rain, looking to the natural aspects as opposed to manmade aspects?

Dr. **Byrne**. Not at this time.

Mr. **Durbin**. Can you give me an idea of what your spending levels are going to be for this type of research for the next fiscal year?

Dr. **Byrne**. We can submit a specific statement for the record. Our judgment is that it is somewhere in the order of $2 million, about $2 million, but we will give you a correct, accurate answer.

[Material to be supplied follows:]

In fiscal year 1984, NOAA expects to spend $2070(K) on acid rain research. NOAA's responsibilities under this national research program in involve:

(1) Developing equipment to measure dry deposition of acidic materials;

(2) making measurements to understand mechanisms of cloud capture and deposition of acidic materials; and

(3) studying the natural sources of acidic materials.

Mr. **Durbin**. This is an increase over last year's expenditures?

Dr. **Byrne**. No, that would not be the increase. That would be the total.

Mr. **Durbin**. I mean, is that an increased expenditure in comparison to last fiscal year for this research?

Dr. **Byrne**. It is an increase of about $700,000 over last year.

Mr. **Durbin**. Thank you. That is all I have.

Mr. **Fuqua**. Mr. Boehlert.

Mr. **Boehlert**. Thank you, Mr. Chairman.

I would appreciate your providing me with that same information.

I wish you would consider in the future amending your statement to, in addition to pointing out that it is an issue of both public and scientific interest, it is also an issue of very deep concern. I would hope that this administration, for which I have great admiration, would do a much better job in terms of acid rain research and development.

I would like specifically the dollar figures for this year compared to the dollar figures for last year, and I would also like—and I assume you have some published findings of your research to date—would you share that with me?

Also, are you doing anything with respect to publishing your findings in journals, that type of activity? Are you keeping all the information in-house?

Dr. **Byrne**. No, no, no. Any scientist aspires to publication of his results in journals. Yes, we are publishing.

We would be very pleased to provide you with as much information as we can possibly put in your hands, specifically with respect to the budget activities and also to the results of our findings.

Mr. **Boehlert**. You cannot live in the Northeastern sector of this country without being deeply concerned about acid rain, Dr. Byrne. Thank you.

Mr. **Fuqua**. Mr. Bateman, you have another question?

Mr. **Bateman**. Yes, Mr. Chairman. Thank you for indulging me. I forgot to inquire concerning the elimination from funding of the sea grant program. Is the premise underlying that that the program as it has previously existed was not getting good results?

Dr. **Byrne**. No, sir.

Mr. **Bateman**. Is it purely a budgetary, austerity proposition?

Dr. **Byrne**. I do not think it is even that simple, if I might comment just a bit on the sea grant program.

I think everyone regards the sea grant program as having been an outstanding success. It was designed to develop a network of institutions that would address problems involving the ocean with focus on the use, the proper use, of the ocean.

Sea grant has, as you understand, I am sure, a requirement that there be a non-Federal match of $1 for every $2 provided by the Federal Government. The fact of the matter is that at most sea grant institutions—and there are about 19 of them now—it is closer to 40 to 50 percent.

It is our feeling that because the program has been successful, because many of the aspects of it are directly related to industry and the development of industry in the oceans, as well as to local problems, that this is a program which could be transferred, support of it could be transferred, to the States, local communities, and to industry.

The network that has developed has become—how shall I say it—complexed with other existing networks. For example, the Sea Grant Association has developed as an association of sea grant institutions that are involved in the program. That has coalesced with the National Association of State Universities and Land Grant Colleges.

One of the aspects of the sea grant program that has been outstandingly successful is the marine advisory program. In most institutions the marine advisory program is also a part of the Agricultural Cooperative Extension Service. Therefore, many of the activities of programs that were developed during the past 12 years or so of sea grant have, in fact, been picked up and folded into existing networks of a much larger scale.

The feeling that industry might contribute more significantly to sea grant support I think is borne out by the fact that our activities in the ocean may be valued as high as $30 billion a year. Certainly, with industry of that capability, it is our feeling that, again, this is an opportunity for the private sector to become involved in a program which has previously been supported by the Federal Government.

That is the rationale for reducing the sea grant budget to zero.

Mr. **Bateman**. I have some implications that the new federalism is involved in that which I am sure my folks back home wonder about. As much as they applaud it, where is the money going to come from?

This is an area—I had always understood that the sea grant program had been an excellent program, a very productive program.

Certainly, I am familiar in my State with one of our institutions that has been significantly involved and significantly expanded its capacity in a very meaningful way as a result of that.

I would like to express my concern that that not be lost. It is perhaps much easier to talk about $30 billion in the economy comes out of marine-related activities, but I suspect that a large part of that $30 billion, a cumulative amount, comes in very small segments where that industry we are talking about does not have the resources to react to the expansion of data and the opportunity to expand their productivity. I am a little nervous about the sea grant program.

Thank you.

Mr. FUQUA. John, I have one question.

I know Mr. Bateman and Mr. Volkmer mentioned this while I had to be out of the room, about the commercialization of the land and weather remote sensors.

What would happen if you commercialized the land and weather remote sensors and then the private concern failed, could not generate enough revenue, could not fulfill its commitments in both quantity and quality? What would happen then?

Dr. BYRNE. With respect to the financial aspect of it, commercialization would require some type of continuing Federal subsidy to insure that it did get up into a profit-making mode. Estimates as to how long that might take run to the order of 10 years or more, based on previous experience with communications satellites.

Mr. FUQUA. Then would there be any assurance that the Government would not have to up its ante if the group got into trouble?

Dr. BYRNE. I think that is the type of question that would be addressed during this 14-month implementation phase, that would need to be addressed to see just what sorts of guarantees, assurance, and so on, would be folded into the system.

Mr. FUQUA. Would that be after the commitment is made or prior to the commitment?

Dr. BYRNE. I would say that it would—I do not mean to hedge on the question, and I am going to let Tony answer it in a second, but I think it is part of the commitment. The decision to move ahead on it will probably have a number of decision points involved with it, at which time it may be prohibitive or it may be something that requires special adjustment.

Do you want to add something to that?

Dr. CALIO. I think you hit the point. The decision will be to move ahead providing we can find an appropriate and a responsible way to proceed. We are going to look at the constraints and regulations that are necessary to make that happen.

At the end of the 14-month period I think we will have the terms and conditions of how we are going to operate in front of us. We will have to evaluate those and assess those from a risk standpoint and, hopefully, try to answer the questions that you just brought up, Mr. Chairman.

I think if the answers are all negative, I would be surprised if it proceeded.

Mr. FUQUA. What kind of commitment would you have? I do not want to see, paraphrasing, the satellite get out of orbit?

If we make a commitment, or NOAA makes a commitment, to turn it over to somebody and then you do the study and the study shows several negative features to it, can you get it back in orbit?

Dr. CALIO. This is not a study. We are proceeding to make it happen. It would be putting in all the terms of reference and the legislation that is necessary for it to be put in place.

Mr. FUQUA. But Congress is going to wonder how much it is going to cost.

Dr. CALIO. Right.

Mr. FUQUA. And what is the outyear commitment?

Dr. CALIO. We will have those numbers.

Mr. FUQUA. You will have those numbers?

Dr. CALIO. Definitely.

Mr. FUQUA. What if you have those numbers and they prove not sufficient to meet the needs that the operating company would have?

Dr. CALIO. You are saying 10 or 15 years hence?

Mr. FUQUA. Eight years.

Dr. CALIO. You are asking me what will happen at that point in time, 8 years from now? My own personal opinion is that, for those elements that the Government thought was important to be maintained, it would go back and fund those activities; for those elements that it thought were not important to go back and maintain, they would not fund them. That is just my own opinion of what would happen 8 years from now if suddenly such a venture did collapse.

Mr. FUQUA. It is not new for the Government to get involved in ventures of that type. I know one that is sitting just east of us here. It is called Kennedy Stadium. The Government assumed the bond and could barely pay the interest on it, and no principal has been paid in over 20 years.

What if we would get into another situation such as that? I know we are talking about different things, but it has not been uncommon for the Government to get involved in something and suddenly the cost escalates, for whatever reasons, and then you find yourself in a bind and the Government is called on to bail it out.

Are you going to make sure that does not happen or will that be part of the study?

Dr. CALIO. Again, it would not be part of the study; it would be part of the negotiations with the various private sector entities to try to see if we can define those assurances, see if we can get those assurances in during the negotiating period. I am sure there would be some that would not get in there, and there will be some risk, but associated with that is the potential of reducing the cost of the Federal Government and the potential of establishing a new industrial base within the United States. There is going to be a risk factor and a judgment call involved in all of that. We will try to establish those as clearly as we can as we move forward.

Mr. FUQUA. Thank you very much, gentlemen. We appreciate your being here again. Thank you very much for your presence today.

I hope you have a good, sharp pencil when you start coming up with those figures.

The committee is adjourned.

[Whereupon, at 11:45 a.m., the committee recessed to reconvene at the call of the Chair.]

FISCAL YEAR 1984 NOAA AUTHORIZATION

WEDNESDAY, MARCH 9, 1983

House of Representatives,
Committee on Science and Technology,
Subcommittee on Natural Resources, Agriculture
Research, and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:20 p.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Present: Representatives Scheuer, MacKay, Brown, McGrath, Chandler, and Lewis.

Also present: Representative Ireland.

Mr. Scheuer. Today the Subcommittee on Natural Resources, Agricultural Research and Environment is pleased to welcome a number of very distinguished witnesses who will present their views on current and future needs of the National Weather Service.

Last Tuesday the full Committee on Science and Technology heard testimony from Dr. John Byrne, the Administrator of the National Oceanic and Atmospheric Administration, on the fiscal year 1984 budget proposal for the National Weather Service. He gave us some good news and some bad news.

We were pleased that NOAA is requesting additional funds to incorporate advanced radar and satellite technologies into the Weather Service. We have frequently urged NOAA to apply these space age technologies to the day-to-day problems of weather forecasting.

The bad news is that in the budget request the adminstration proposed: First, reducing meteorological staff at over 80 weather stations; second, eliminating one of the Nation's two polar orbiting weather satellites; and, last, curtailing a variety of weather services tailored to agriculture, aviation, and forestry. If these proposals were approved by Congress, the Weather Service would operate at its lowest staffing level since the 1960's.

Therefore, while we are encouraged that the administration is committed to improving the technological base of the Weather Service, we are concerned that the Service may not be able to do its job adequately with diminishing human resources. The central question that we intend to examine today is whether technology can replace dedicated, experienced meteorologists without losses in the quality of local weather forecasting and in local services.

These hearings will also lay the groundwork for the subcommittee's continuing examination of the appropriateness of transferring either weather services or weather satellites to the private sector, which is the issue that received front page attention in yesterday's press. I note for the record that President Reagan did agree yesterday to transfer the weather satellites to the private sector. We will have extensive hearings on that matter, with all its complexities, in April or May.

Now to help us today in examining these issues, we will hear from Congressman Dick Durbin, a freshman Democrat from Illinois, who will discuss agricultural weather services; Dr. Warren Washington, Chairman of a panel of the National Advisory Committee on Oceans and Atmosphere which produced a July, 1982 report on the future of the Nation's weather services. We will hear from Dr. George Benton, former Associate Administrator of NOAA; Mr. David Johnson, former director of NOAA's satellite programs; Mr. Leo Harrison, president of the National Weather Service Employees Organization; Mr. Jeff Bowman, a Washington area field meteorologist; and Mr. Bobby McKown, who will discuss agricultural weather services from the perspective of the citrus growers from the State of Florida.

Appropriately enough, we have newly elected Congressman Lewis from the State of Florida, who will have a statement for us.

Mr. LEWIS. Thank you, Mr. Chairman.

I want to welcome our fine panel of witnesses here to the subcommittee this afternoon, and in particular my good friend, Bobby McKown, with Florida Citrus Mutual. Bobby and I have worked together for many years on issues important to Florida agriculture, and I am pleased that the subcommittee has the opportunity to hear from him regarding the administration's proposal to eliminate the fruit frost warning system in Ruskin, Fla.

I share Mr. McKown's concern that this policy will have a potentially crippling effect on future citrus production in Florida. The cost of maintaining this station and operating a fruit frost warning program is a drop in the bucket, compared with the value that this critical information provides all farmers and growers in States like Florida, California, Texas, the Southwest and Midwest. Mr. Chairman, I am pleased that the other members of the subcommittee will benefit from the wealth of knowledge and experience that Mr. McKown brings to us today.

That concludes my statement, Mr. Chairman, but also I would beg your leave to provide you with a statement for Mr. McGrath, who could not be with us today, for insertion in the record.

Mr. SCHEUER. I take it you are hereby asking unanimous consent for his statement to be included in the record?

Mr. LEWIS. That is affirmative, Mr. Chairman.

Mr. SCHEUER. There being no objection, so ordered.

[The prepared statements of Mr. McGrath and Mr. Lewis follow:]

PREPARED STATEMENT OF HON. RAYMOND J. MCGRATH

Mr. Chairman, I, too, would like to welcome our distinguished witnesses here today.

This hearing on our nation's weather services is especially timely in view of the announcement made yesterday that we should proceed with the transfer to the private sector of our civil weather and land remote sensing satellites.

The data obtained from the weather satellites is vital to the forecasting ability of the National Weather Service. The transfer which is proposed would certainly have a tremendous impact on the operations of the weather service. I, for one, am not at all convinced that the weather satellites, which are so important for the protection of the health and safety of our citizens, should be transferred to the private sector. In addition, I am concerned about the national security and international relations implications of such a transfer.

A related issue about which I have a great deal of concern is the proposed reduction to a one-polar orbiting satellite system. The Committee on Science and Technology spent a great deal of time on this issue last year, and found that a one-polar system would result in considerable risk, both in the areas of weather forecasting and national security. I am anxious to hear our witnesses' comments on this proposal.

This subcommittee must examine in detail these and other important policy questions related to the National Weather Service. While we must at all times keep in mind the tremendous federal deficit, certainly in the forefront of all our decisions is also the priority that the health and welfare of the public be assured.

PREPARED STATEMENT OF CONGRESSMAN TOM LEWIS

Mr. Chairman, I want to welcome our fine panel of witnesses here to the subcommittee this afternoon, and in particular my good friend Bobby McKown with Florida Citrus Mutual.

Bobby and I have worked together for many years on issues important to Florida agriculture, and I am pleased that the subcommittee has the opportunity to hear from him regarding the Administration's proposal to eliminate the Fruit Frost Warning System in Ruskin, Florida.

I share Mr. McKown's concern that this policy will have a potentially crippling effect on future citrus production in Florida. The cost of maintaining this station and operating a Fruit Frost Warning Program is a drop in the bucket compared with the value that this critical information provides to all farmers and growers in states like Florida, California, Texas, the Southwest and the MidWest.

Mr. Chairman, I am pleased that the other members of the subcommittee will benefit from the wealth of knowledge and experience that Mr. KcKown brings to us today.

Mr. SCHEUER. Now I will yield to Congressman Buddy MacKay, also from the State of Florida, for any formal or informal statement he cares to make.

Mr. MACKAY. Mr. Chairman, I don't have any opening statement. I would like it known that I am in the citrus business. We grow oranges, and we are in the very northern part of the Florida Citrus Belt, so I have more than an academic interest in this issue.

Mr. SCHEUER. You are deeply concerned, I take it, at any potential threat in the flow of necessary, urgently needed weather information to citrus growers in Florida?

Mr. MACKAY. My concern would be not that I am a knee-jerk opponent of the effort to try to privatize, but simply that I don't see how it can work, and I am here to try to see if somebody can explain it.

Mr. SCHEUER. Right. We all have an open mind, do we not?

All right, we are here completely with an open mind, without having in any way prejudged this issue. I extend the long arm of welcome and friendship to my two Florida colleagues, who are deeply concerned about the threat to any cutoff in the flow of necessary weather information, including emergency frost warnings, for example, and the threat that that might hold to the citrus-growing industry, as well as the threat that it might hold to other small users of weather information like newspapers in small towns; small, independent television stations and radiostations that proliferate through the State of Florida and elsewhere in our country.

Therefore, we are aware of the threat. We have many, many questions and we look forward very much to the witnesses. Our first witness will be the Honorable Richard J. Durbin, a very honored and valued Democratic colleague of ours from the State of Illinois.

Mr. **Durbin**. Thank you very much, Mr. Chairman.

Mr. **Scheuer**. Now your prepared remarks will be printed in full at the appropriate point in the record, so we would suggest that you hit the high spots, chat with us informally for 6 or 8 minutes, and then I am sure we will have some questions for you.

STATEMENT OF HON. RICHARD J. DURBIN, A MEMBER OF CONGRESS FROM THE STATE OF ILLINOIS

Mr. **Durbin**. I will be more than happy to follow that format in an effort to help close your mind on this issue from my perspective. [Laughter.]

The issue before us, and I think before the entire Congress, is the proposed elimination of the Agricultural Weather Service Centers. The proposed elimination of four of these centers would affect directly the Agricultural Weather Service Center that is located in the Midwest region and serves five States: Ohio, Indiana, Michigan, Kentucky, and of course Illinois.

We have heard a lot of talk from the administration and a lot said in the last couple of years about getting Government off our backs. I would like to demonstrate to this subcommittee, if I can, how taking Government out of the weather business as far as the Agricultural Weather Service Center is concerned may take Government off our backs in a small way, but it will put the elements of nature squarely on the shoulders of agricultural producers in the Midwest. I would like to do it with some graphic examples of dollars saved and dollars spent.

The annual net worth of agricultural production in the five States I have just listed for the Midwest region is estimated to exceed $15 billion. The total annual impact of weather and weather-related losses is 5 to 10 percent of that total production, or a total estimated loss due to weather in that region of $750 million. My own home State of Illinois estimates the loss each year at $350 million on an average from weather-related losses.

Agricultural experts in the area estimate that the agricultural weather information supplied by the centers that are proposed to be eliminated is effective in eliminating 10 percent, or $75 million, of that estimated $750 million loss to the farm community. This translates into a savings in Illinois of $35 million to Illinois farmers from the valuable information that is provided by these Weather Service centers.

What does it mean in the day-to-day life, though, of the agricultural producer? Let's consider one particular and specialized program that comes out of that Weather Service Center. There is a savings to the farmers in my area due to the pest-disease management and FACTS program. Improper application of pest control due to the lack of accurate weather data can cost an individual producer dearly.

The average Illinois farmer would have to pay $2,000 for an extra pesticide application in the event that he applied at a time when it was improper and it would not take, based on the 1982 estimate by the Crop Reporting Board of the USDA, which places the average size of the farm in Illinois at 276 acres, and an estimation of pesticide application by an agribusinessman in my district. You can see that the elimination of this service with pesticide alone, when applied to farmers in my area, would quickly result in a net loss to the farmers.

How much are we going to save, now, if we eliminate these Weather Service Centers, if we are going to step away from a $75 million savings to the agricultural community and the possibility of individual farmers having additional expenses, as I mentioned? The dollar operating cost of the service in question that I mention today is $300,000 annually, less than one-half of 1 percent of the $75 million saving to farmers and consumers.

I would like the committee to consider this afternoon—I am a member of the Agriculture Committee—for 50 years in this country, almost 50 years to the day, we have been committed to the Agricultural Adjustment Act and its successors to stand between the farmer and the vagaries of weather, to make certain that our farm community had some stability in pricing. It has not been a program without cost, as we all know well, for price supports and loan rates to maintain a strong national farm economy.

Consider what we are doing in the elimination of the Weather Service Centers. We are saying to these farmers, "We are hopeful that you will be able to survive. We will stop providing you the information to help you survive." However, ultimately, if we think there is a cost savings to the Federal Government, let us consider the fact that we are going to be asked in the Agriculture Committee to make up the shortfall if we in fact eliminate these Weather Service Centers. The shortfall, of course, will be the fact that if we are going to make up in crop price supports and loan programs what the farmer has lost because of weather, then in fact we have not had any savings whatsoever in eliminating these Weather Service Centers, and in fact we find ourselves, I think, in a position of spending more money.

It is ironic to me that for over a century now there has been a healthy cooperation and partnership between Government and the agricultural sector. One of my predecessors in this particular congressional seat was a gentleman by the name of Lincoln, who when he was President of the United States in the 1860's, formed the Department of Agriculture and the land grant colleges. That partnership, that cooperation between the Federal Government and the farming community, has been healthy.

If we take a step away from that today with the elimination of these Agricultural Weather Service Centers, we are not only destroying that valuable partnership but we are making a false cost savings. We are not taking Government off the backs of farmers; we are putting the elements and vagaries and the burden of weather forecasting right square on the shoulders of the farming community. I urge the committee, in considering this privatization proposal, to consider the practical impact of what appears to be a very minor cost savings.

I would be happy to entertain any questions.

[The prepared statement of Hon. Richard Durbin follows:]

Testimony of Congressman Richard J. Durbin
Before the Subcommittee on Natural Resources, Agriculture Research and Environment
March 9, 1983

Mr. Chairman, I would like to thank you and the members of the subcommittee for the opportunity to testify before you here today on the proposed FY '84 elimination of the Agricultural Weather Service Centers.

The proposed elimination of the four Agricultural Weather Service Centers would leave a drastic void in the agriculturally related weather data that is currently being provided by these centers. If passed, it will mean higher crop losses for our farmers and higher grocery prices for our consumers. In my opinion we can achieve much greater savings elsewhere without hurting the American people.

The Agricultural Weather Service Center located in the Midwest region currently serves a five (5) state region composed of Ohio, Indiana, Michigan, Kentucky, and of course Illinois. The annual net worth of agricultural production in this region is estimated to exceed fifteen (15) billion dollars. The total annual impact of weather and weather-related loss is 5 to 10 percent of that total production, or a total estimated loss of $750 million. My home state of Illinois is estimated to contribute roughly $350 million, or nearly one half of the total weather-related loss in this region.

Agricultural agronomists estimate that the agricultural weather information supplied by the centers are effective in eliminating ten (10) percent or $75 million of the estimated $750 million dollar loss to the farming community. This translates into a savings of over $35 million dollars to the Illinois farmers.

A large portion of this savings is made possible through the twice daily agricultural weather advisory services. These services include reports on the effects the weather can have on crops and livestock. The reports also include operational data such as soil moisture, freeze depth, and several special forecasts. However, even more substantial is the savings due to the pest-disease management and FACTS program. Improper application of pest control due to the lack of accurate weather data can cost the farmer dearly. The average Illinois farmer would have to pay $2,000 for an extra pesticide application. This is based on the 1982 estimate by the Crop Reporting Board of the USDA, which places the average size farm in Illinois at 276 acres, and an estimation of a pesticide application by an Agri-businessman in my district. This program in particular, if eliminated, will not be replaced by private enterprise.

The roughly $300,000 dollar operating cost of the Midwest Agricultural Weather Service Center is less than 1/2 of 1 percent of the $75 million saved by farmers and consumers.

BUDGET CUTS LIKE THESE MAY MAKE SENSE TO SOME CHAIRBOUND OMB BUREAUCRAT. BUT TO THE THOUSANDS OF ILLINOIS FARMERS I REPRESENT, WHO RISK LOSING HUNDREDS OF THOUSANDS OF DOLLARS AS A RESULT OF INADEQUATE WEATHER INFORMATION, THIS IS AN EXTREMELY SERIOUS MATTER. IN ANALYZING THESE FIGURES, IT WOULD APPEAR TO ME THAT THIS SERVICE IS CERTAINLY COST EFFECTIVE.

WHOEVER DEVISED THIS PLAN DOES NOT REALIZE HOW IMPORTANT THE AMERICAN FARMER IS TO OUR COUNTRY. THE ADMINISTRATION'S SHORT SIGHTED EFFORT TO SAVE $300,000, WHILE PLACING THE BURDEN OF A $75 MILLION LOSS ON THE AMERICAN FARMER AND CONSUMER, IS ANOTHER EXAMPLE OF THIS ADMINISTRATION'S LACK OF UNDERSTANDING INTO THE PLIGHT OF THE AMERICAN FARMER.

THE LOSS OF THESE AGRICULTURAL WEATHER SERVICE CENTERS IS OF MAJOR CONCERN TO THE FARMERS OF MY DISTRICT. PRIVATE WEATHER SERVICES DO NOT AND WILL NOT REPORT THE INFORMATION THAT IS VITAL TO HOLDING DOWN PRODUCTION COSTS TO THE FARMER. THE LAST THING OUR FARMERS NEED IS HIGHER PRODUCTION COSTS.

Mr. SCHEUER. Thank you very, very much for that most interesting, thoughtful statement.

Mr. Lewis, do you have any questions?

Mr. LEWIS. I have no questions, Mr. Chairman.

Mr. SCHEUER. Mr. MacKay.

Mr. MACKAY. Well, I think you basically are expressing the same concerns that the agricultural industry in Florida would feel. We are very sensitive to frost and have highly specialized agricultural forecasting services there, and you are basically expressing the same concerns that we have.

I guess jokingly I was saying I don't see how this could work as a private sector effort, and I think that is exactly the concern you are expressing.

Mr. DURBIN. It is, and I think when we consider the fact that for what we get from this expenditure of money in terms of strengthing our national economy, that it is a modest investment in a program that has had a long and rich history in this country.

I thank the subcommittee for the opportunity of testifying this afternoon.

Mr. SCHEUER. I think you're not finished yet.

Do you know of any cost-benefit analysis that has ever been done by the administration or any other supporter of this move to reduce the flow of weather data?

Mr. DURBIN. I am not aware of any. I would be very interested in seeing how we are making any kind of savings, when we consider the long-term expense that would be brought on if we lost more crops by weather and then we are forced to increase agricultural spending to keep producers in business.

Mr. SCHEUER. You know of no professional cost-benefit study that has been made?

Mr. DURBIN. I am not aware of any. I don't know if OMB has such a study.

Mr. SCHEUER. OK. Congressman, you gave us very excellent, very provocative, and very thoughtful testimony. We appreciate it very much.

Mr. DURBIN. Thank you very much.

Mr. SCHEUER. All right, now, we will have the three witnesses who will join us at the witness table as members of a panel: Dr. Warren Washington, member of NACOA, the National Advisory Committee on Oceans and Atmosphere; Dr. George S. Benton, Department of Earth and Planetary Sciences, Johns Hopkins University; Mr. David Johnson, University Corporation for Atmospheric Research.

We are delighted to have you. We are going to ask each of you to testify, to chat with us for 5 to 7 minutes, hitting the highlights of your testimony, and then after that I am sure we will have some questions for you. All of your prepared remarks will be printed in full at the appropriate point in the record, so you can chat with us just as if you were sitting in our living room. OK?

We will start off with Dr. Warren Washington, member of NACOA.

STATEMENT OF DR. WARREN M. WASHINGTON, MEMBER, NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE

Dr. WASHINGTON. Thank you very much, Mr. Chairman.

I see that a lot of media attention has been given to the possibility of the privatization of satellites but I want to address a much broader area including that NACOA has undertaken a study to see what the future of the National Weather Services ought to be in the 1980's and 1990's and beyond.

NACOA is concerned about the deterioration of the safety of citizens, the deterioration of the services and the fragmenting of the services. The thing that we want to emphasize is that the weather services are a complicated mix. In fact——

Mr. SCHEUER. A complicated what?

Dr. WASHINGTON. It's a complicated mix.

Mr. SCHEUER. Mess?

Dr. WASHINGTON. No, I said mix, m-i-x, of the private as well as the public. The National Weather Service is only a small part of the total weather services. There are about 18,000 people in the Federal Service who are providing weather services. Of those, about 5,000 are in the National Weather Service.

The issues that face us have to do with how much of the new technology is going to replace the conventional technology. It is our view that the new technology can replace some of the existing technology, but we feel that [illegible] mostly enhancing service and giving better data and better forecasts to the public.

There are essentially three areas that we want to separate. One is in forecasting severe weather; the second is the general forecast; and the third is specialized forecasts which you have already heard about. The first two were addressed by everyone who came and testified before NACOA, including representatives of the private sector. All kinds of users felt that the Government ought to continue being the major provider of the severe weather warning and general forecasts.

Now the specialized forecast is broken up into two areas. First, for a large segment of the economy—for example, the citrus growers or the farmers, who benefit from weather information—ought to be given weather services by the Federal Government. Second, if the specialized services are aimed at any particular individual or a small corporation, they ought to be provided in the private sector by private meteorologists or industrial types.

On the satellite issue, let me touch on that just a bit. We felt that the turning over of the weather satellites to the private sector ought to be viewed with extreme caution. We don't see any distinct advantage to that, principally because the biggest customer would be the Government itself. There would be some loss of control in terms of expenses; the Congress would not have as much control over it if it were in the private sector. Also, you may find that the necessary satellite information could be compromised because of the orbits and the other things which would drive a multipurpose satellite system, so that you may not optimize it for weather purposes.

On the question of user fees, we found that user fees generally were a bad idea, principally because there are many observations provided to the Weather Service by commercial aviation, by the merchant marine, by citizens themselves at no cost. There are something like 12,000 volunteers who provide data. Television, the radio, and the newspaper use this weather information on essentially a quid pro quo basis; they take care of dissemination of the data. We feel that they can just as easily charge the Government for the broadcasting of this data, if they are charged for use of the data.

The only exception to extensive user fees is the aviation industry, and we felt that the aviation services ought to be part of the Airport and Airways Trust Fund.

I think I would like to end up by saying that any changes in the services and in the privatization ought to be done with extreme caution. NACOA has put up a red flag—we don't see any particular advantages, although as the previous speaker said, we are trying to keep our minds open for some kind of cost-benefit study. We have not seen one.

At that point I think that I would like to end. I would be very happy to answer any questions.

[The prepared statement of Dr. Washington follows:]

STATEMENT
by
Dr. Warren M. Washington
National Advisory Committee on Oceans and Atmosphere*
before the
Subcommittee on Natural Resources, Agriculture Research and Environment

March 9, 1983

Thank you, Mr. Chairman. I appreciate your invitation to present the views of the National Advisory Committee on Oceans and Atmosphere (NACOA) on the Nation's weather services.

One of the most pressing problems facing the weather services today is that the services are caught, as are many organizations dependent on high technology, with rising costs. As a result of pressures to reduce Federal funding and personnel, there is concern for the ability of weather services to maintain adequate capabilities for forecast and warning responsibilities for public safety. In addition to examinations of present systems, there is increased probing for alternative funding sources and performing entities.

The concern of NACOA is focussed on (a) the possible deterioration of public safety warnings because of continued budget reductions, and (b) the possible disarray of the national framework providing forecasts and warnings if organizational diversions are undertaken without adequate consideration of all parts of the framework and their critical linkages.

For these reasons we undertook to examine the situation in some depth. The result is our report, "The Future of the Nation's Weather Services," which we sent to the President and to the Congress in July 1982. For your ready reference, I have appended to this statement the Summary of the Findings and Recommendations of our report.

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*The National Advisory Committee on Oceans Atmosphere (NACOA) is a non-Federal, 18-member body, appointed by the President. Members represent industrial, scientific, and environmental concerns associated with atmospheric, marine, and coastal zone policy. Enabling legislation (Public Law 95-63) mandates that NACOA advise the President and Congress on these matters.

The weather services of the United States are an extremely complex mix of public and private services; they are multi-institutional. By multi-institutional, we mean that while the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA) is the central agency and the key to the services provided to the public, it is not the sole or even the major agency. In fact, it is less than half of the total resources applied. There are nearly 18,000 people in the Federal Government providing weather services; the National Weather Service has about 5,000 of these. Only one-fourth of the weather observations are taken by the National Weather Service. Who are the others? These are people in the Department of Defense (DOD), Federal Aviation Administration (FAA), and various other Federal agencies. And there are over 12,000 volunteer observers who report daily weather observations. Moreover, the Federal funding for weather services is not principally in the National Weather Service. The National Weather Service spends only about 30 percent of the total national budget for weather services.

So Mr. Chairman, for whatever purpose Federal weather services are examined -- whether you are talking about "privatizing," user fees, or funding the services -- it is not just a question of NOAA and its National Weather Service. The examination needs to consider the roles of FAA, DOD, and other agencies as well as the private sector contributions to the Federal complex. We believe this is an aspect that has not been adequately examined nor recognized by those who propose to adjust budgets. The National Weather Service is the key to the entire system, but it is fully dependent on the entire complex.

Moreover, Mr. Chairman, the Nation's weather services are not exclusively Federal -- but a combined public and private system. It really does not matter whether one is a television weathercaster, or an employee of a private corporation that provides the highway department with weather forecasts, or a forecaster in the National Weather Service -- everyone depends on a systematically coordinated observational system, data collection, and analysis transmission, and so on. In summary, everyone depends on a strong central weather service represented by the National Weather Service.

What are some of the issues confronting the National Weather Service? If we look at what the capabilities are for technology to provide improved services, these capabilities are large, indeed.

The National Weather Service has the following problem when it comes to balancing support of its current systems and incorporating new technologies that can vastly improve service to the public. Basically, it is a budget problem. Should they give up the more conventional weather facilities and services in order to introduce some of the new, but expensive, technologies? This is a terrible dilemma. For example, a modern weather service cannot be operated without satellite observations. Our country would not allow the Federal Government to operate a hurricane warning service without a geosynchronous satellite that has proved to be such an important contribution to public safety warnings. We do need new technology for improved public safety, such as the next generation weather radar, known as NEXRAD. We need the improvements in the satellite system, new upper air sounding systems, and automated data collection system. But it is expensive.

On the other hand, while new technology can replace some older technologies, their primary benefits are improvement, not replacement. We still need surface observations, upper air measurements, etc.

Thus, we find that other parts of the system are under tremendous pressure -- weather stations with reduced staffs, weather stations closed, programs cut, and so on. Are we seeing a deteriorating weather service in the interest of getting important new technology? We take the view that the system needs help. If we take both the conventional and the new technologies, it is going to be costly.

The second issue concerning the National Weather Service is the number of weather stations. Are all of these stations needed? Last year there was a proposal, later rescinded, to close 45 stations. This year we do not see a proposal to close weather stations, but we do find a proposal for 25 or so weather offices to reduce their staffs, and for several other weather forecast stations to downgrade their overall capabilities.

In doing our report, we sought studies, clues, or criteria on why weather stations are needed, where they are located, and how many were needed. We do know that for scientific purposes, e.g., forecasting, observations spaced a certain distance apart are needed to observe storms of a certain size. But we see other functions that a local weather station has -- one of which is to provide service to the community. The farther a weather forecaster is from the community served, the less effective that person is in providing service because of less familiarity with the topography of the surrounding area and of the needs of the community. We think this need for local services dictates that alternate funding methods be explored with local communities -- perhaps on a matching fund basis or cooperative basis. We found that criteria to determine which communities shall have weather services provided by the Federal Government are not available, and we believe that such criteria should be established.

The funding and staffing of the National Weather Service has gone down during the past decade as have other operating elements of NOAA, except for the satellite services. We are deeply concerned that this decrease in staff will seriously affect the ability to provide public warnings of hazardous weather. We are concerned that, given another "Camille" or another "Agnes," the system might not be able to provide the timely forecasts and warnings that the Nation's citizens expect.

Another significant issue is the potential growth of multiple weather services and the consequences of such growth to our entire public weather warning system. In most countries of the world, there are a number of weather services -- one for aviation, one for agriculture, one for the military, and so on. But in almost all of these countries, one finds rather weak weather services. Only in those countries that have a strong central service do we believe the citizens are provided with effective services.

In the current FY 1984 budget, the Administration is proposing to cut agricultural weather services, aviation weather services, and reduce fire weather services. What we are liable to see if these cut backs are instituted are the same programs supported, with a probability of greater expense and lesser effectiveness, by different agencies; for example, a separate agricultural weather service, supported by the Department of Agriculture. If the fire weather services are cut, it is unlikely that the National Forest Service would leave large areas of valuable public lands without warning protection. It might contract or hire its own meteorologists. What we are likely to see are weather services at other departments, providing us with a weaker, fragmented, and decentralized Federal weather service, much less efficient and more costly. We do not believe that multiple weather services provide the kind of national weather services needed by the public. In our view, a strong, centralized weather service is the necessary ingredient.

The role of the private sector in providing weather services is another issue. Weather forecasts can be categorized into severe weather forecasts, general forecasts, and specialized forecasts. In our deliberations, those who appeared before us agreed that the [illegible]ral Government should be responsible for severe weather forecasts and warnings. They also agreed that, at a small marginal cost, the government can and should provide general forecasts -- these are the forecasts you hear over the radio and read in the newspapers.

The question of who provides specialized services is the thorny one. We distinguish between two types of specialized services -- those that serve a broad sector of the national economy and those that are tailored to corporations or individuals. The former address agriculture, aviation, those in the marine activities, and so on. The latter would include a public utility, a company that provides ship routing, a farmer, or a major construction firm.

It is our view that the Federal Government should provide weather services to broad sectors of the economy. We believe it is in the national interest to do so for the ultimate benefit and safety of all the public. The private sector, however, should provide specialized services to individuals and corporations.

In the dissemination of weather information, the private sector has, by far, the greater role. And we have no problem with that; we believe it should be encouraged. Most people get their weather forecasts and information from the television, radio, and newspaper. For the government to duplicate that service would be extremely costly. But we do add one caveat -- every citizen should have a right to the official forecasts warnings of the government without having to depend on third party.

Let me return to the cost of technology. As I mentioned earlier, instruments and observing platforms are available for major improvements to public weather warnings. The Doppler radar, meteorological satellites, automated ground observing system, etc., can give us the capability to observe and forecast the motion of the most destructive weather phenomena. But they are costly -- about $1 billion dollars in procurement costs and equal to the current total annual Federal operating budget for weather services. It is our recommendation that the improvements in service are worth the benefits to the public, and that a 10-year program of implementing new technology would be a reasonable approach to provide the necessary funds. This would amount to an increase in the total Federal weather expenditures of about 7 percent per year for 10 years.

On the question of user fees -- our bottom line is that quid pro quo considerations militate against the charging of fees for most of the weather services.

For example, the weather observations taken at sea are provided free to the government by over 2,000 merchant ships. Fishermen also transmit observations at sea. Pilots provide, free of charge, valuable, otherwise unobtainable, upper air observations to the National Weather Service. All of this information is of a considerable value to the total complex of information required to produce analyses, forecasts, and warnings. We would also add that public broadcasts by television and radio are the most effective transmission system available and are provided freely for the dissemination of the government's forecasts and warnings.

Aviation weather is a special case. Here we see weather information as part of the infrastructure, similar to runway lights, necessary for aviation safety for which a tax is levied for users of airports. The proceeds go into the Airport and Airway Trust Fund. It is our view that the incremental costs of aviation weather services can be and should be funded by that tax.

User fees might be levied on the private meteorologists for the basic National Weather Service data that they require for their work. We see no quid pro quo. But, here, the area is so small -- about 80 companies -- that the amount collected would be nominal, and we have recommended against it.

Finally, we have looked at the operation of the National Weather Service as a private corporation. In looking at the total system, we found it convenient to look at the weather services as three distinct functioning areas: data acquisition, data analysis and forecasting, and dissemination. We conclude that the data acquisition function should remain a Federal responsibility. But if the funds necessary to introduce new technology or to operate the system are not available through the appropriations process, then a quasi-governmental corporation should be considered. We conclude, however, that because the many elements of data acquisition are effective only as an integrated system, it should not be operated by the private sector in piecemeal fashion, i.e., radars operated by one company, satellites by another. Moreover, if data acquisition is put in the hands of the private sector, then the data analysis and forecasting functions should also be included, because these functions are so closely linked to data acquisition.

In the final analysis, we conclude that placing the operation of these functions in the private sector is a poor second choice to the way it is managed in the Federal Government in the current organizational structure. We do not see any increase in efficiency, and we have many concerns with "privatization." We have reservations about disconnecting the weather services from national defense. We are concerned about the data the volunteer cooperative observers -- over 12,000 on land and 2,000 merchant ships -- provide. We are concerned about the relationship between such a private corporation and the private meteorologists who provide specialized weather services, and we have concerns about the close international cooperation of freely exchanged data among countries that has been forged over many years. So we advise that the question of "privatization" be approached with extreme caution -- that not only the National Weather Service, but all public and private components of the complex mix need to be considered in an extensive and thorough study of the possible consequences, and ... most importantly ... considered only if some way cannot be found to support the current system adequately within the Federal Government.

Mr. Chairman, this concludes my remarks. As I mentioned, the Summary of Findings and Recommendations is included in the testimony.

I will be glad to answer any questions.

SUMMARY OF FINDINGS AND RECOMMENDATIONS FROM NACOA'S REPORT, "THE FUTURE OF THE NATION'S WEATHER SERVICES"

The Public-Private Mix of Weather Services

1. We find the present national weather system to be a complex mix of interdependent public and private services that has evolved over the years to provide the United States with effective weather services for protection of the public, for its safety and welfare, and for the efficient operation and planning of economic activities. This kind of mix serves the public interest well.

The Need for New Technology

2. We find that the new technology of weather observations, communications, and data processing is indispensible to the advancement of the Nation's weather services. We recommend that policies be adopted which can permit the introduction of this technology without compromising general weather services dependent on more conventional technology.

We believe that the risk of exposure of citizens of the United States to weather hazards can be significantly decreased by the procurement and installation of new observation, communications, display, and data processing systems. Such procurement will be costly but, in our view, the benefits will far outweigh the costs. We recommend that adequate funding be provided for the new technology.

Effectiveness of the National Weather Service

3. We are of the opinion that the effectiveness of the National Weather Service in achieving its end objective of protecting the public and serving the economy is enhanced when there is a close relation between community and service. It is important, therefore, that "service" criteria be established to determine which and how many communities shall have local weather service provided by the Federal Government.

We find that the proposals for changes in the number and distribution of weather stations of the past several years do not conform to well-understood criteria. We do not believe that the almost "hit or miss" approach to weather station closures of the past several years has served the Nation well.

We recommend that criteria be developed for weather station closure and establishment. We also recommend that possible cooperative funding arrangements between the Federal Government, States, and local communities be explored.

The Need for a Strong Central Government Weather Service

4. We recommend that current policies for operation of Federal meteorological services should continue to be based on the maintenance of a strong central weather service to provide weather warnings and common weather services for all Federal agencies. Steps should be taken to ensure that these policies can be effectively implemented to prevent the establishment of multiple weather services.

Public-Private Weather Services Responsibilities

5. The primary responsibility for predicting life-threatening weather events should rest with the Federal Government's National Weather Service. The National Weather Service should issue general forecasts for the public.

We recommend that current weather data and forecasts acquired and prepared by the Federal Government should be provided without charge to organizations and institutions that further the objective of the widest possible dissemination of weather warnings.

We advocate a continuing role for the Federal Government in providing the specialized analyses and forecasts that serve broad economic sectors where there is a high national interest, as defined by Congress, as well as those that are required by other Federal agencies in the conduct of their missions. We see the private sector as providing analyses and forecasts that particularize information to meet the needs of specific clients or constituencies.

The Dissemination of Weather Warnings

In light of the increasing role of the private sector in the dissemination of weather information, we recommend that the Federal Communications Commission take steps to ensure that all weather emergency messages and warnings of the National Weather Service are properly disseminated, identified, and carried in broadcasts.

User Fees

6. We find the concept of user fees for federally supplied weather information attractive but conclude that the implementation of user fees may be practical only in special cases. Many organizations that now receive weather information and data from the government free of cost to themselves, contribute valuable and otherwise unobtainable weather data, and frequently provide essential dissemination services at no cost to the Federal Government. Services designed to protect life and property should not be withheld from those unable or even just unwilling to pay. Some sectors, such as shipping, agriculture, and aviation, bulk so large in the economy and the national interest is so strong that the Federal Government continues to have an important responsibility for providing weather services aimed at increasing their productivity and efficiency. Where the private sector is increasing its provision of weather services, such as is increasingly the case with dissemination, quid pro quo considerations generally militate against the institution of fees.

We recommend that any establishment of user fees for private sector users of Federal Government weather data and services should take into account the quid pro quo contributions of the private sector to the observation, communication, and dissemination functions of the total national weather system. These quid pro quo contributions by the private sector provide vital elements of our weather service and are generally provided free of charge to the Federal Government to ensure effective weather service.

The aviation industry pays special excise taxes into a trust fund set up under the authority of the Airport and Airway Development Act of 1970 to support airport construction and other aspects of the infrastructure of the Nation's airways. We support the use of this fund to provide federally supplied aviation weather services. We see aviation weather services as an integral part of the Nation's airways systems. If other private sector activities, such as shipping, waste disposal at sea, and the like are brought into similar tax arrangements, we recommend that weather services applicable to those activities be funded out of such receipts.

Data Acquisition - A Federal Responsibility

7. We recommend that the Federal Government retain full responsibility for assuring that the Nation has a data acquisition system capable of acquiring the full set of observations necessary to describe the conditions of the atmosphere and to forecast weather phenomena on all scientifically meaningful time and space scales. We see agencies of the Federal Government as the operators of the bulk of this sytem with some operations in special circumstances in the private sector. This policy is essential to:

a) Provide for an integrated data acquisition system whose management can organize, coordinate, and ensure timely transmission of data from many different platforms, collected by many different entities.

b) Provide the international data exchange arranged by governments among all countries of the world to ensure adequate basic weather data necessary for preparation of weather forecasts.

c) Ensure data quality control and a system design for optimal coverage and information integration to serve both civil and national security needs.

Basic Data Analysis and Forecasting -- A Federal Responsibility

8. We recommend that the management and operation of the Nation's basic data analysis and forecasting functions continue as a Federal responsibility. This function produces the weather information base common to all weather service products for both public and private use. The discharge of this function requires that computer and communication resources be integrated with the data acquisition system. Only the Federal Government is in a position to discharge this responsibility as long as the data acquisition functions remain a Federal responsibility.

The Private Sector Operation of the National Weather Service

9. If Federal funding through traditional Congressional appropriations cannot provide for the necessary acquisition of technology for weather observations, and for the basic analysis and forecasting functions, we recommend a study of the establishment of a quasi-government corporation in the private sector to undertake weather data acquisition, and basic analysis and forecasting functions. Under contract, such a corporation would provide those services required by the Federal Government and would have authority to supplement Federal funds from other sources. At this time, we do not find the establishment of a quasi-government corporation to be a desirable course of action, because we do not foresee an increase in efficiency.

The Interdependence of the Nation's Weather Services

10. We believe that, in any planning for change in financing and management of weather services, recognition must be given to the fact that the Nation's weather services involve the pooled activities of a number of Federal agencies as well as institutions in the private sector and that all elements need to be considered.

Mr. **Scheuer**. Thank you very much, Dr. Washington.

Do you know of any thoughtful, professional cost-benefit studies or risk-benefit studies that have been done to validate the cost savings to the Federal Government, and which would indicate that the cost savings to the Federal Government would be far greater than the risks incurred by users of weather information, risks incurred once that weather information were denied or sharply reduced?

Dr. **Washington**. No. In fact, our study took over a year and we had testimony from many different people—as I said earlier—many sectors of users, of Government, and so forth. We found no such study. In fact, if I can speak for myself, we were somewhat surprised at the fact that the administration had taken the steps that it took yesterday without having public forums which could openly discuss it. That was rather a surprise to some of us.

Mr. **Scheuer**. Thank you very much, Dr. Washington.

All right. Our second witness will be Dr. George S. Benton, Department of Earth and Planetary Sciences, Johns Hopkins University.

STATEMENT OF DR. GEORGE S. BENTON, DEPARTMENT OF EARTH AND PLANETARY SCIENCES, JOHNS HOPKINS UNIVERSITY

Dr. **Benton**. Thank you, Mr. Chairman and members of the subcommittee. It is a pleasure for me to be here today.

I am appearing today in my role as chairman of a steering committee of outstanding scientists appointed by the University Corporation for Atmospheric Research, a nonprofit consortium of 50 universities in the United States which maintain graduate programs in meteorology or closely related disciplines. Over the last 2 years our committee has evaluated the adequacy of existing weather services and supporting research, and has considered opportunities for economical and timely improvements.

Mr. Chairman, most of the discussion today is revolving around why some of the cuts in the Weather Service's budget may not be justified. I would like to turn the question around. Our committee, after very careful deliberation, has come to the conclusion that only a moderate injection of new funds into the weather services of this country could result in tremendously improved services to the citizens of this country, not only to the general public, but also to Government, to industry, to agriculture, and to national defense. I really believe that the crucial issue is not what should we cut but what should we be doing that we are not doing now, and that is really the subject that my committee has been looking at over the last 2 years.

We feel that today there is a major scientific and technological opportunity to achieve a tremendous increase in our ability to understand and predict the occurrence of small-scale weather events, and these are the kinds of systems that cause us the most trouble. They are primarily the ones that dislocate our economy and cause major problems to our industry and to our agriculture.

I would like to point out that the storm scale phenomena, which is what we call these phenomena, include such outbreaks as tornados, downbursts such as have caused serious aircraft accidents in recent years, violent squall lines, severe thunderstorms, rain-induced flash floods, and local heavy snows. They also include nonviolent weather: freezing rain, dense ground fog, or low-lying clouds which disrupt aviation and ground transportation; persistent temperature inversions which cause local air pollution, or strong nocturnal cooling which produces killing frosts. These are all small-scale weather phenomena.

Why do we think that this is an opportune time to improve our weather services so that we can better predict these phenomena? The answer is clear. For the last three decades the discipline of meteorology has spent the major part of its attention improving its ability to forecast the large-scale weather phenomena which dominate our atmosphere—the movement of the large cyclones and anticyclones, the large fronts, the large air mass changes—and we have become pretty good at this. We have improved this ability tremendously over the last 30 years, and we have very hard evidence to show that this is the case.

However, all too often it isn't this very gross regional pattern which causes the bad weather, which causes a problem to agriculture or industry. It is, rather, local weather phenomena which are imbedded in the larger scale structure, and when it comes to these local weather phenomena we have not been nearly as successful.

Well, I don't think for one minute that what my scientific discipline has done over the past 30 years is wrong. When you are approaching a subject that you want to understand, the first thing you generally do is try to understand it in the large scale, to get a good picture of the overall behavior of the system you are looking at, and we have now achieved that objective in large measure. However, the next step is to begin to look at some of the smaller scale phenomena, and that is the stage that we are at in meteorology today.

There are basically three major reasons why we are ready to attack small-scale meteorology with a coherent and extensive program today. The three reasons are, first, our vastly improved understanding of the large-scale circulations which gives us an understanding of the background against which the smaller scale systems occur.

The second reason is that we have tremendously fine technology to observe the smaller scale systems in a way that we have never been able to observe them before, using satellites, Doppler radar, small-scale nets of weather observing stations, many, many techniques that we have not adequately used in the past. We cannot only observe these systems on a fine scale today but we can collect this information with modern communications systems, analyze it quickly by computer-assisted methods, and get our forecasts in virtually no time at all to the user community.

I visualize a situation when in not too many years it will be possible for a citizen to go over to his television set and turn on his television to a cable television channel and get a complete picture of weather in the vicinity of his particular location, projected on a map of his State. He will see, for example, that there is a squall line 30 miles to the west which is approaching at the rate of 10 miles an hour and, Mr. Chairman, it doesn't take any great intellect to know that if that is what he is seeing on the television set in front of him, that he can expect some bad weather in a few hours.

The impact of this kind of capability on this country will be tremendous. It will be tremendous for Government, which can improve its efficiency. It will be a great help for Defense, which needs this kind of information because it operates very often under very marginal conditions of safety where fog or other difficulties can cause real problems in their operating capability. It will help agriculture, whether to harvest your hay, whether to harvest your crop, whether to irrigate this afternoon. If it is going to rain in 3 hours, you certainly don't want to go to the expense of irrigating in the afternoon. Millions of small decisions will be made which will save a good deal of money.

It will help the general public because the general public makes millions of decisions each year which are important to it: Should I keep my children home from school today because it is snowing? Is it going to continue to snow? Should I send them or should I keep them home? The kind of up-to-the-minute forecast that we are capable of making with a modern weather service will revolutionize the usefulness of weather information for the public.

Mr. Chairman, what our committee has done is to put out a document. We call it the national storm program, which is our acronym for this program which we believe this country needs. We call our little document—which you have in front of you, I hope—"A Call to Action," because it is a call to action. It is a call to this country to create the kind of weather service that we are capable of creating, and which will give the kind of information to our citizens that they deserve.

Mr. Chairman and members of the subcommittee, we believe that the national storm program is a concept ready to be implemented. The scientific and technical community in the United States, within and external to the Government, awaits the opportunity to launch a major attack on the losses and inefficiencies which result from inclement weather. Government at all levels, the national defense, the general public, agriculture, industry, all will benefit. In fact, I can't think of one single reason why we shouldn't do it. Let's have the kind of weather service that our citizens deserve. The costs will not be negligible but the benefits will so far outweigh the costs that to me it is unthinkable that we should not proceed.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Benton follows:]

March 9, 1983

WEATHER SERVICES AND SUPPORTING RESEARCH IN THE UNITED STATES: THE NEED FOR A NATIONAL STORM PROGRAM

Testimony by Dr. George S. Benton
Professor of Meteorology, The Johns Hopkins University

It is a pleasure for me to appear before the Subcommittee on Natural Resources, Agriculture Research, and Environment to discuss weather services and supporting research in the United States.

I am appearing today in my role as chairman of a steering committee of outstanding scientists appointed by the University Corporation for Atmospheric Research (UCAR), a non-profit consortium of 50 universities in the United States which maintain graduate programs in meteorology or closely related disciplines. Over the last two years, our committee has evaluated the adequacy of existing weather services and supporting research, and has considered opportunities for economical and timely improvements.

It is the conclusion of our committee that a major scientific and technological opportunity exists to achieve a breakthrough in our ability to understand and predict the occurrence of the small-scale weather events which dominate our local weather.

To this end, our committee has proposed the development of a national effort -- a National STORM Program. The primary purpose of the program will be to enable our weather services (public and private) to observe, predict, and disseminate timely forecasts of stormscale weather phenomena with the accuracy and reliability necessary to protect the public, serve the national economy, and meet defense requirements. The program will also develop the understanding of these phenomena required for the effective use of climate and weather information by government, industry, and agriculture.

Our committee has prepared a report which describes the program; explains why it is important and why it can succed; evaluates costs and benefits; and indicates what must be done to get the program underway. The benefits of the program so markedly outweigh the costs that we call our report The National STORM Program: A Call to Action.

Mr. Chairman, you and each of the members of the Subcommittee have a copy of this report before you. I would like to enter the full report into the record, and I am prepared to present a very brief summary of its contents at the present time.

A BRIEF STATEMENT OF THE NATIONAL STORM PROGRAM

Weather comes in all sizes. The steady, soaking rains that cause floods on the Mississippi River may cover a dozen states and result from a large atmospheric disturbance many hundreds of miles in diameter. The snow blanketing New England in winter may come from a "northeaster" -- a large coastal storm which may extend from Cape Cod to Cape Hatteras.

Contrast the weather from these large-scale systems with a flood-producing thunderstorm or a violent tornado. A severe thunderstorm may affect an area of a few square miles; a "twister" may leave a wake of destruction only a hundred yards wide and a fraction of a mile in length.

Much of the weather that disrupts economic activity -- and affects the lives and property of citizens -- is caused by phenomena which are very limited in extent. The meteorologist uses the term mesoscale to describe these systems; we have chosen the more descriptive designation stormscale.

Stormscale phenomena include severe weather such as tornadoes or downbursts, violent squall lines and thunderstorms, rain-induced flash floods, or local heavy snows. They may also include nonviolent weather: freezing rain, dense ground fog, or low-lying clouds which disrupt ground or air traffic; persistent temperature inversions which cause extreme local air pollution; or strong nocturnal cooling which, combined with local air drainage, may produce killing frost.

Stormscale phenomena are closely related to large-scale weather. It is the distribution of large-scale cyclones and anticyclones -- low and high pressure areas -- that determines whether a broad region has predomenantly stormy or fair weather. But it is the occurrence of stormscale phenomena which determines the particular locality within the stormy region that experiences the devastating flash flood or the destructive windstorm. Stormscale phenomena are embedded within the large-scale weather patterns, and it is often the specific location and time of occurrence of the stormscale events that are of the greatest concern to our citizens.

If we are to forecast and then verify the occurrence of stormscale weather, we must first be able to observe it: to detect its genesis, development, and motion. Yet, until recently, our operational weather services -- civilian and military -- were designed to observe large-scale weather systems. Stations which take surface observations are spaced 50 to 100 miles apart; stations which measure winds and temperatures through the depth of the atmosphere are spaced even more widely -- 150 to 300 miles on the avarage. This netweork provides excellent information about large-scale atmospheric systems: the major cyclones and anticyclones, the air masses and weather fronts which cause our regional weather. It provides little or no information about the individual severe thunderstorm or tornado which occurs between observing stations, and insufficient information about the storm which affects a single station.

During the last two decades, radar and other ground-based remote sensing techniques, polar-orbiting and geostationary weather satellites, and dense, automated surface observing networks have begun to provide a way to observe stormscale weather. Yet progress is slow. We have not been making sufficient use of these new observational techniques -- and we have been slow to introduce powerful new technology such as Doppler radar, which renders many of the present operational observing systems obsolete.

This situation can be changed. State-of-the-art technology places at our disposal powerful ways to observe stormscale meteorological events with substantially improved accuracy, to collect and process the data, and to disseminate information directly to the user -- all within a matter of minutes. Once this basic flow of information has been established, steady improvements will follow in our ability to forecast small-scale weather systems. The total process can be stimulated and accelerated by modern research techniques, which will provide insight into the basic physics of stormscale systems and will point the way toward the effective use of this understanding in forecasting and in a host of weather-related activities.

Two parallel efforts are required. The first is to plan and implement an operational program -- including the development of a STORM Warning System -- which will deploy the technology necessary to observe, analyze, forecast, and disseminate information concerning stormscale weather. The second is to plan and conduct a supporting research and technology development program -- a STORM Research Program -- to provide improved measurement and communication systems, to develop more effective forecasting methods, and to achieve a better understanding of stormscale phenomena.

Continuous interaction between these two programs is needed. Problems of operational weather forecasting must be formulated and communicated to the research scientist and engineer; advances in observational capability or in fundamental understanding must be translated into productive action.

The importance of stormscale weather has been known for many years. Why have meteorologists concluded that today this subject is ripe for attack? Why do scientists believe that within the next decade they can solve stormscale problems trhat have resisted solution for many generations?

Three basic ingredients for success are now in hand. The first is our vastly improved understanding of and ability to predict the large-scale motions of the atmosphere: the movements of the cyclones and anticyclcones, air mases and fronts which cause regional weather. These skills largely result from the effective use of numerical models and high speed digital computers, developed over the last several decades. They make it possible for us to describe accurately the physical background within which stormscale systems form, grow, and decay.

Second is state-of-the-art technology which makes it possible to plan and construct a system to observe, analyze, and disseminate stormscale weather information with a level of accuracy and timeliness which is substantially greater than would have been possible only ten years ago.

Third is the availability of improved computers -- and increased modeling capability -- which make it possible to extend to stormscale phenomena the techniques of numerical simulation now being used so effectively on the larger scales. The first significant steps in this direction have already been taken in research.

The stage has been set for a major assault on stormscale weather. The day is not far off when the user of weather information -- the urban dweller, the farmer, or a representative of government or industry -- can go to his television set and obtain, on demand, a map of his region showing the weather in his vicinity, including the location and extent of significant local weather systems such as thunderstorms or regions of snow or rainfall. He will also receive a forecast of changes in the weather, with computer-generated displays on the regional map to show the expected movement of stormscale weather systems over the next several hours. With such a modern weather system at his disposal, each individual can begin to use stormscale weather information efficiently and effectively.

Every indication is that the National STORM Program is timely, and can succeed. The outlines of the program -- the various steps that must be taken in operations and research -- are set forth in the Call to Action report.

WHO WILL BENEFIT FROM THE NATIONAL STORM PROGRAM?

The National STORM Program will benefit almost everyone: the general public, civil government at all levels, national defense, agriculture, and industry.

The general public will be one of the major beneficiaries of improved stormscale forecasting. Tens of millions of weather-related decisions are made daily. These range in nature from fairly trivial decisions . . . "Should I take an umbrella to work?" . . . to ones more important to the individual . . . "It's snowing; should I keep the children home today" . . . to those that are deadly serious . . . "The sirens are blowing and a tornado alert is on, should I take cover?"

There are many indicators that the public is intensely interested in weather.

- Each year approximately one billion calls are placed to local telephone companies to listen to transcribed weather reports. If the average cost of each call is assumed to be ten cents, the public is paying about $100 million annually for this information.

- Continuous weather reports are provided on dedicated channels through the NOAA Weather Radio Network. These reports can be received on special, single-purpose sets which can be purchased at prices ranging from $15 to $75. Approximately $100 million is spent annually to purchase these receivers.

- The total spent each year to distribute weather information by telephone, radio, and television is about $1.7 billion -- more than three times the cost of civil weather services in the Federal government and about seven times the budget of the National Weather Service.

The dissemination to the public of up-to-the-minute local weather information and very short-term forecasts is an essential part of the National STORM Program. Forecasts of severe weather will help the public avoid hazards to life and property; forecasts of more normal weather will help the citizen make better choices, improve the quality of his life, and avoid petty frustrations. All of the evidence indicates that the public wants this information, believes it needs this information, and is willing to pay for it.

Government -- Federal, state, and local -- will benefit from the National STORM Program. In government, many programs are weather-related. Agriculture, commerce, energy, environmental quality, transportation, public health and safety -- the government's business is dependent on today's weather.

A few examples will suffice. When the President officially designates a disaster area, the chances are better than eight to one that the problem is weather-induced. Blizzards, flash floods, hurricanes, tornadoes -- the roster of stormscale catastrophes is long. Disasters caused by severe weather place urgent demands on local and state police, and on health and public assistance agencies. At the Federal level, agencies such as the Federal Emergency Management Administration are directly involved. The consequences of many weather disasters can be reduced by adequate warnings.

Systems of transportation are weather dependent. Municipal traffic and transit systems are severely affected by snowstorms, freezing rain, or fog. State and interstate highway systems can be crippled by a severe flood or by a winter blizzard. The design and efficiency of air traffic control systems -- the responsibility of the Federal Aviation Administration -- depend crucially on our ability to observe and forecast severe or otherwise disruptive weather.

Systems of water management are weather dependent. Schedules of water use for irrigation and the management of flood control structures can be improved by timely and accurate forecasts of precipitation. The Bureau of Reclamation, the Corps of Engineers, and other agencies such as the Tennessee Valley Authority -- all are involved in management problems of this type.

Better stormscale forecasts can readily be translated into increased efficiency of civil government at the local, state, and Federal level.

National defense is even more dependent on the weather. High performance aircraft in the Air Force or the Navy may be required to operate with comparatively small margins of safety. The severe thunderstorm which forces a commercial airfield to close down for 30 minutes may cause traffic delays and inconvenience passengers; the same storm unexpectedly occurring over a military airfield or an aircraft carrier could cause disaster. Similar problems may result from high winds, low clouds, or fog.

Problems of battlefield environment have become increasingly important as weapon systems have become more sophisticated. High-technology electromagnetic sensors, operating at a variety of wavelengths, are affected by the temperature and moisture structure of the atmosphere. These special areas of stormscale weather forecasting can be dramatically improved by techniques developed as part of a National STORM Program.

In agriculture virtually every activity is weather-dependent, and major costs are associated with short-term decisions. Irrigation schedules can be adjusted to take advantage of local rainstorms; crop-dusting operations can be timed to avoid high winds or precipitation; harvesting can be advanced or delayed to minimize crop loss. Agriculture in the United States depends on information sources such as the NOAA Weather Radio Network to obtain its local forecasts. The National STORM Program can dramatically improve both the timeliness and the accuracy of the weather information provided to the farmer.

But perhaps the broadest application of stormscale forecasting will involve industry: including transportation, construction, energy, retail sales, and recreation. Consider, for example, general aviation -- a rapidly growing industry which is highly weather dependent. There are more than 200,000 privately owned aircraft in the United States, and about 360,000 operators with private licenses. The planes have lower performance characteristics and are more sensitive to bad weather than commercial or military aircraft; the operators are often comparatively inexperienced.

Most aircraft in general aviation operate in and out of small airfields at which no weather observations are taken. When the large-scale weather patterns are hazardous, general aviation usually receives adequate notice and appropriate adjustments are made in flight schedules. All too often, however, the aircraft are severely affected by stormscale weather that has little impact on commercial or general aviation. Weather-related events in general aviation annually cause the loss of about $50 million and 800 lives.

A National STORM Program could have a profound impact on major sectors of society: the public, government at all levels, national defense, agriculture, and industry. Would such a program also be cost-effective?

THE COSTS AND BENEFITS OF THE NATIONAL *STORM* PROGRAM

It is impossible at this time to prepare detailed estimates of the cost of the National STORM Program. Neither plans nor preliminary designs are available for the required operational systems or the supporting research effort, and the boundaries of the program are not yet precise. Nevertheless, some rough estimates can be made. Our committee has estimated that over the next decade, as a result of the STORM program, incremental costs above existing out-year plans would be in the range of $60 to $120 million per year in fiscal 1982 dollars. Since Federal expenditures for the atmospheric sciences -- civil and military, operations and research -- are about $1.3 billion annually, this would represent an increment of about five to ten percent.

Quantitative benefits will accrue in four ways. *First*, weather-related property damage will be reduced. Each year our nation pays a frightful toll to nature (as the recent floods on the Mississippi and the storms in California have so clearly illustrated). The total of all weather-related losses probably exceeds $20 billion a year. And a substantial part of the total is attributable to stormscale weather.

How much damage could be avoided if better stormscale warnings were available? The *potential* value of a forecast is primarily a function of its timeliness and accuracy. Its *actual* value depends on whether the user receives the forecast promptly, and on whether it stimulates him to take appropriate action. Whether or not the forecast is effective is strongly influenced by the user's *level of familiarity* with the specific weather phenomenon, on his *perception of the probable accuracy* of the forecast, and on his *ability to take protective measures*. One of the strengths of the National STORM Program will be that the regular dissemination of stormscale forecasts will rapidly increase the public level of understanding with regard to severe weather events. This educational process will, in the long run, contribute substantially to reduced loss.

Our committee has estimated that a modern STORM Warning System can, within the next decade, reduce property damage due to weather-related events by at least five percent. This would correspond to a saving of $1.0 billion per year -- an amount roughly ten times the total cost of the program. Reducing property damage by even one percent ($200 million per year) would provide savings substantially greater than the incremental cost of the STORM program. And all will benefit: the general public; Federal, state, and local government; agriculture; and industry.

A second major benefit will accrue from improving the efficiency of agriculture and industry. Many examples could be cited:

- An accurate stormscale forecast of an afternoon thunderstorm may cause a farmer to postpone irrigating his fields. This could save thousands of dollars.

- A stormscale forecast of cloudy skies, with temperatures rising above the freezing level, may lead a construction firm to go ahead with a concrete pour, thus completing a contract on time.

- A stormscale forecast of a local snowstorm may allow a municipal transit authority to call up snow removal crews two hours earlier (or later) than would otherwise have been possible. This will improve the effectiveness and reduce the cost of snow removal.

- A forecast of low clouds and high winds may cause an oil company to dispatch a helicopter to an off-shore platform two hours ahead of schedule. This may permit the company to rotate personnel on schedule.

As these simple examples illustrate, better weather information can be used to improve efficiency. And increased efficiency can immediately be translated into higher profits and a sounder economy.

Meteorologists in the private sector will play a crucial role in helping agriculture and industry learn how to use stormscale information to best advantage. This process is already underway. In the last two decades, many large corporations have added weather experts to their staffs; smaller companies have generally chosen to rely on the services of a private meteorological consulting firm.

The growth of private meteorology in the service of agriculture and industry has been rapid. In future years, as our ability to prepare accurate stormscale forecasts increases, even more rapid growth can be anticipated.

A third benefit of the National STORM Program is the value of public interest forecasts. Accurate stormscale weather information will enhance the public's ability to make effective decisions in everyday living

Whether an individual citizen decides to carry an umbrella when going out on an errand -- or whether he or she closes the windows when leaving home, in expectation of a thunderstorm -- is not a momentous decision. The economy of the nation is not seriously affected by the result. In fact, one could argue that the neighborhood dry cleaner -- or the local home improvement contractor -- benefits from the unexpected wind and rainstorm which soaks the unwary shopper or damages the finish of the living room floor. But to the individual, the result is unpleasant: time is wasted, and scarce resources are spent in unproductive ways.

What is the value of timely, accurate stormscale forecasts to the general public? There is no easy answer to this question. One approach is to make a speculative, back-of-the-envelope computation. Let us assume that the average citizen makes only one stormscale weather-related decision each week -- 50 per year. If the average value of each decision is only 25 cents, the total value of the ensemble of decisions is $2.5 billion annually.

The enormity of this figure helps explain why (as we have already noted) our society spends $1.7 billion annually to disseminate weather information to the general public. After all, if the back-of-the-envelope computation has any validity, it must somehow be related to the willingness of the public to pay for the information it requires. In these terms, the $100 million spent annually for special-purpose radios permanently tuned to NOAA weather broadcasts -- or the one billion telephone calls made each year to hear automatic recordings of current weather conditions -- take on more significance.

The fourth benefit of the National STORM Program will be reduction in loss of life and injury. Each year many thousands of people are killed and injured as a result of weather-related events. Stormscale systems are responsible for most of these casualties. The largest loss of life comes from the impact of weather on transportation: for example, about 800 persons are killed annually in general aviation as a result of weather-related accidents. Flash floods result in a death toll of over 200 per year.

Our committee has estimated that over a period of 20 years, loss of life due to severe stormscale weather can be reduced by a factor of two. This corresponds to a saving of well over a thousand lives annually. Much larger reductions will occur in the number of personal injuries.

Will the National STORM Program be cost-effective? Our committee made no effort to derive a numerical benefit-cost ratio for ther program. Too often such numbers are self-serving and difficult to justify. In the last analysis, a decision to support or not to support a program involves not only economic considerations, but also subjective judgments implicitly related to issues of public policy.

We have shown that substantial benefits will accrue from the National STORM Program in four different areas: reduction of property damage; improvement of the efficiency of government, agriculture, and industry; enhanced flow of information which is in the public interest; and reduction of loss of life and personal injury. Any one of these benefits alone could be used to justify the STORM program.

HOW CAN WE GET STARTED?

The National STORM Program will be a complex effort, involving the expenditure of substantial resources. The diverse participating agencies will include a number of government agencies, as well as universities and industry. The program itself will be a long-term effort, national in scope. It will involve both operations and research, with the customary difficulties of coordination. Oversight responsibility will be required at a number of levels: within the scientific community, for technical validity; within the Executive Branch, for managerial effectiveness.

Finally, Congress must become involved in the program. The National STORM Program will benefit broad sectors of our society, including the general public. Fundamental issues of public policy are involved. The welfare and safety of the public will be enhanced, as well as the efficiency and well-being of agriculture and industry. The support of the Congress in making available the necessary appropriations, and the involvement of Congress in the oversight process, are essential to the success of the effort.

Some suggestions with regard to an organizational framework for the National STORM Program are included in the Call to Action report. But the primary issue is not the organization -- or even the oversight -- of the program.

This country has developed, at substantial cost, new technology for remote sensing of weather information. We have pioneered in the operational deployment of weather satellites -- and in the use of high speed digital computers for data analysis and weather prediction. We have led the world in communication technology. The primary issue is whether these capabilities and technologies will be put to use to provide the American people with the kind of modern weather service they need to meet the demands of our complex society. The alternative is to export the technology, and allow other developed countries to lead the way.

Mr. Chairman and members of the Subcommittee, we believe the National STORM Program is a concept ready to be implemented. The scientific and technical community in the United States, within and external to the government, awaits the opportunity to launch a major attack on the losses and inefficiencies which result from inclement weather. Government at all levels, national defense, the general public, agriculture and industry -- each will benefit.

NOW is the time to begin.

Mr. **Scheuer**. Thank you very much, Dr. Benton.

We are going to ask all of the witnesses questions when the three of you have completed your testimony, but I am going to ask you, just as I have asked Dr. Washington and Congressman Durbin, do you know of any cost-benefit or risk-benefit study that has been produced by the administration in helping them achieve a reasonable, sensible, thoughtful decision radically to reduce the funding and the personnel for the Weather Service?

Dr. **Benton**. No, Mr. Chairman, I do not. Good cost-benefit studies are very difficult to come by. We made a very distinct effort to make such an analysis in our committee over the last 2 years. It is very difficult to do but I might say that every such study that I know of indicates that the weather services are among the most cost-effective services that the Government offers.

Mr. **Scheuer**. Do you have any recent cost-benefit analyses of the Weather Service that you can provide us for our guidance in evaluating——

Dr. **Benton**. You will find a cost-benefit discussion in this little publication of ours which I think you will find of interest, Mr. Chairman, and which I hope will appear in the record. However, I cannot really direct you to anything that I would regard as definitive.

Mr. **Scheuer**. OK. Thank you very much for your fine testimony.

Now, before we get to the questioning period for all of the witnesses, we will hear from Mr. David Johnson of the University Corporation for Atmospheric Research.

Mr. Johnson.

STATEMENT OF DAVID S. JOHNSON, UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

Mr. **Johnson**. Thank you, Mr. Chairman and members of the subcommittee. I am very pleased to be asked to comment on the proposed NOAA budget for 1984 as it relates to the Nation's weather satellite program. As the former Assistant Administrator of NOAA for satellites, until January 1982, I am sure you recognize that I have more than a passing interest in this subject.

Since retiring from NOAA over a year ago, I have been working as a special assistant to the president of the University Corporation for Atmospheric Research, which is a consortium of 50 universities with graduate programs in atmospheric sciences and related fields, and also as a consultant to the Secretary General of the World Meteorological Organization, a specialized agency of the United Nations.

In the latter capacity I have been helping them to figure out how to maintain and indeed improve the World Weather Watch, that all the countries of the world are dependent upon. The headquarters of the WMO is based in Geneva. Most of the activities that are undertaken by the organization are by the consent of the 150-some member nations, and most of the components are carried out by voluntary contributions of time and effort and such things as satellites.

Mr. **Scheuer**. Please continue.

Mr. **Johnson.** I would like to emphasize that I am not appearing here on behalf of either WMO or UCAR but in my capacity as a private citizen of the United States. In particular I would like to emphasize, though, some of the considerations that I think go beyond the U.S. Government, because of the perspective that I have been gaining in the past year.

Regarding the polar satellite system, the proposal of the administration is to reduce it from the present two-spacecraft system to one. In summary, I think such a reduction would be disastrous, not only to the weather services of the United States but to the many nations of the world which have become dependent on this important source of global weather data.

The compelling reason for a two-satellite system is not the increased data that would be available from the double coverage of two such satellites, as valuable as this may be. The primary motivation is the need for in-orbit backup. Indeed, I might mention, Mr. Chairman, that this was the basic reason that the two-satellite system was initiated in the first place. With two satellites in orbit, when one fails the other is still available.

Under the proposed plan, if there were premature failures of the NOAA spacecraft in orbit or the premature failure of one spacecraft followed by a launch failure, there could be a complete cessation of global satellite coverage for a long period of time. It should be recognized that the NOAA operational satellite system has indeed in the past suffered both launch failures and premature in-orbit spacecraft failures. This is just the way the game is played. It does happen.

The polar orbiting satellites make important contributions to weather forecasting. They not only cover the polar regions but also provide vertical temperature and moisture soundings over the whole Earth, including the data-sparse oceans.

What would be the impact of a policy to provide only one polar orbiter instead of the two-satellite system that we have employed so successfully? The most likely result is that this key element of the global weather observing system would collapse, with catastrophic results. For example, we would have zero atmospheric sounding coverage over most of the oceans. Storms, including hurricanes, come to us from the Pacific and the Atlantic.

The whole international weather monitoring structure would be compromised, especially the remote atmospheric sounding measurements made from space and the location and collection of data from drifting buoys, balloons, and other automatic observing systems in remote places. We will suddenly have intolerable gaps in our global data base.

The impact of the total loss of polar satellite coverage also would be catastrophic to many other nations as well. More than 100 countries have ground equipment to receive data broadcasts directly from the NOAA satellites. In many developing countries these data represent the primary source of regional weather observations. The sounding data I mentioned earlier are an important part of the World Weather Watch under the aegis of the WMO; indeed, the Commission for Basic Systems of the WMO states that these satellites are an essential part of the World Weather Watch.

Thus, proposed changes in the U.S. operational weather satellite system, including commercialization, should not be considered as a domestic issue only. This Nation should and does have a responsibility in the larger community of nations. This community should be involved in finding responsible alternatives, if indeed the United States no longer is in an economic position to continue financing the present system upon which the world has become so dependent.

The satellite program also is sick in other respects. The innovative arrangement between NASA and NOAA, which worked so well until a few years ago to provide new instrument developments and prototypes of NOAA operational satellites and sensors, has been almost totally abrogated. I urge that methods be found to continue to improve the operational system in important ways.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Johnson follows:]

Testimony of
David S. Johnson*

to the
Subcommittee on Natural Resources,
Agriculture Research and Environment

of the
Committee on Science and Technology
U.S. House of Representatives

March 9, 1983

Mr. Chairman and members of the Subcommittee, I am pleased to be asked to comment on the proposed NOAA budget for FY 1984 as it relates to the nation's weather satellite program. As the former Assistant Administrator of NOAA for Satellites, I have more than a passing interest in the subject. Since retiring from NOAA over a year ago, I have been working as a special assistant to the President of the University Corporation for Atmospheric Research (UCAR), a consortium of 50 universities, and as a consultant to the Secretary-General of the World Meterological Organization (WMO), a specialized agency of the United Nations, on maintaining and improving the World Weather Watch. While I am appearing here in my personal capacity, this recent experience has broadened my view of the importance of the satellite system beyond the needs of the U.S. Government.

In particular, I was asked to comment on the Administration's proposal to reduce the NOAA polar orbiting satellite system from the present two-spacecraft system to one. In summary, I think such a reduction would be disastrous, not only to the weather services of the United States, but to the many nations of the world who have become dependent on this important source of global weather data.

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*These remarks are made in Mr. Johnson's personal capacity and do not represent the views of the University Corporation for Atmospheric Research or the World Meteorological Organization.

The compelling reason for a two-satellite system is not the increased data available from the double coverage, valuable as this may be. The primary motivation is the need for an in-orbit back-up. With two satellites in orbit, when one fails the other is still available. When a polar orbiter fails, present operating procedures call for a second weather satellite to be launched as soon as possible. This takes a minimum of three months when an expendable launch vehicle is used; it would take much more than three months with a shuttle launch. If there should be a launch failure, present operating procedures call for a third weather satellite to be launched, and the process continues until two operating satellites are again in orbit. With this type of operational plan, the United States has been able to maintain at least one operating polar-orbiter in space at all times.

The new plan calls for a launch on a fixed schedule, I believe every 16 months, regardless of the status of the in-orbit satellite. Thus, if there were premature failures of the NOAA spacecraft in orbit, or the premature failure of one spacecraft followed by a launch failure, there could be a complete cessation of global satellite coverage for a long period of time. It should be recognized that the NOAA operational satellite system has in the past suffered both launch failures and premature in-orbit spacecraft failures.

The polar-orbiting satellites make important contributions to weather forecasting. They not only cover the polar regions, but also provide vertical temperature and moisture soundings over the whole earth in inaccessible areas, including the data sparse oceans. What would be the impact of a policy to provide only one polar orbiter instead of the two-satellite system we have employed so successfully? The most likely result is that a failure of this single polar orbiter or a launch failure would leave us without observations -- perhaps for several months -- until a replacement could be launched. This key element of the global weather observing system would collapse, with catastrophic results. For example, we would have zero atmospheric sounding coverage over most of the oceans. Storms come to us from the Pacific, but hurricanes come to us from the Atlantic.

The whole international weather surveillance structure would be compromised, not only the remote atmospheric sounding measurements made from space, but also the location and collection of data from drifting ocean buoys, balloons, and automatic observing systems in inaccessible places. We will suddenly have intolerable gaps in our global data base. This is bad enough for day-to-day weather forecasting, but it also would impact the global climate data sets being collected. A gap in a climate record practically destroys it for a significant period on each side of the gap. How can one get an average when important data which contribute to that average are missing?

The impact of the total loss of polar satellite coverage would be catastrophic to many other nations as well. More than 100 countries have ground equipment to receive data broadcasts directly from the NOAA satellites. In many developing countries, these data represent the primary source of regional weather data. The sounding data I mentioned earlier are used internationally in numerical weather forecast models which provide basic forecasts of global circulation and weather systems. This is part of the World Weather Watch under the aegis of the WMO. Indeed, the Commission for Basic Systems of the WMO states that these satellites are an essential part of the World Weather Watch.

Thus, proposed changes in the U.S. operational weather satellite system should not be considered as a domestic issue only. This nation should and does have a responsibility in the larger community of nations. This community should be involved in finding responsible alternatives if, indeed, the United States no longer is in an economic position to continue financing the present system upon which the world has become so dependent.

The satellite program also is sick in other respects. The innovative arrangement between NASA and NOAA which worked so well until a few years ago to provide new instrument developments and prototypes of NOAA operational satellites and sensors has been almost totally abrogated. This will preclude improving the operational system in important ways in the future.

Mr. SCHEUER. Thank you very much, Mr. Johnson.

I am going to ask all three of you a question: NOAA is currently using OMB Circular A-76 to examine which positions and functions in the weather service and in the satellite service might be contracted out to the private sector. I am going to ask you several questions relating to that.

What is your view of the A-76 process as applied to the satellite service? What was your experience during the Carter regime with the effort to contract out satellite service functions? How do you evaluate that? Do you believe, finally, on the bottom line, that significant portions of the service could be contracted out?

Mr. Johnson and then the other two witnesses.

Mr. JOHNSON. My remarks will pertain only to the National Earth Satellite Service, since I have some familiarity with that, not the other parts of NOAA. I think that the first thing that should be said is the satellite service already has a large contract element. This has been true for many, many years. The spacecraft themselves are built by industry. In the present situation, RCA builds the polar orbiting spacecraft and Hughes builds the geostationary spacecraft. They are then launched for NOAA by either DOD or NASA, using the Eastern Test Range for the geostationary satellites with the Delta launch vehicle—again, a contract operation—or refurbished Atlases off the West Coast that is done by a mixture of contract and DOD employees, so that is a contract operation.

Once the satellites get into orbit, many of the operational functions are performed by contractors now. For example, the geostationary satellite images that you see on TV at night or various weather forecast offices use, are all processed and disseminated by contract activities, with the contractors doing their work in Federal facilities.

If my memory is correct, the total civil service staff for NESS is about 600 less employees, and I would guess in the operational activities only—the day-to-day operation, not the construction of launch vehicles and satellites—that over 200 contract employees, in sense, equivalent employees, are working. Therefore, contracting out has been in existence for NESS for a long time.

You are correct that there is a major push now to increase this throughout NOAA. I personally do not know what new jobs are being proposed within NESS for additional contracting out.

I think there are functions that can be contracted out. Obviously, as a manager of the satellite program, we contracted out, and in retrospect—at least with those jobs where we did that—I think that we gained something. Indeed, it is my judgment that we did a very fair and careful analysis of what it would cost using civil servants versus what it would cost under contract, and that the Government and the taxpayer have benefited from the contracting that NESS has done.

It had another advantage, in that it gave flexibility to the manager: As program demands changed, new things came in, you could make adjustments more easily because you could negotiate with the contractor for new work skills. Sometimes that is difficult with civil service because you may have a person that has to be retrained and you are not able to do so, whatever the restriction may be.

There are dangers, the first is how it is done, the transition. If you are threatening to contract out sensitive operations, what do your present employees do? They are very likely, if they find another job, to take that job. By the time you get through the very laborious process, you may find that all of your top-notch employees have already left you and this could threaten the operation, so the process is a very important one.

Second, I think it is a question of responsibility. The law I believe says that the Government should remain responsible for its actions, so you have to be careful in defining the kinds of work that would be contracted out. This should be looked at very carefully.

Thank you, Mr. Chairman.

Mr. SCHEUER. Dr. Washington.

Dr. WASHINGTON. I have some very severe concerns about the control factor. It seems rather odd that you would contract out something that is going to be done by the private sector, and then the Government be the biggest customer. I would think it would be much better for the Government to remain in control.

I think NACOA strongly feels the idea of contracting is a good idea, but the control ought to be maintained within the Government. There are all kinds of issues that we have to deal with—the international aspects which we touched on; the possible closing down of many of the private meteorologists who are tailor-making their data for specific customers. They are probably going to be forced out of the market. There will probably be some restriction of the data to researchers who have helped to develop this marvelous satellite system.

The element of noncompetition is of concern to NACOA also, so I don't see any big savings by transferring it out, and in fact you are going to be losing some control in having a less integrated weather service. If the radar is operated by one company and the satellites operated by another company and then somebody else is doing this and that, each one of them is sort of making their own demands upon the Federal Government for supporting them, how are you going to have an integrated system? Ask the question.

Mr. SCHEUER. It is a good question. Are there any elements of satellite services that you think should not be contracted out because of security concerns or public safety concerns, whatever.

Dr. WASHINGTON. Well, you have different motives. I suppose it can been handled through contract between the Government and private corporations but the Government has the responsibility for life-threatening forecasts, and for the protection of property and helping the economy.

Mr. SCHEUER. Also national security.

Dr. WASHINGTON. Also national security.

Now a company may want to think about maximizing its profits. Is the weather service——

Mr. SCHEUER. It is almost predictable that they will.

Dr. WASHINGTON. That is right, and if the motive is to maximize profits, it may be wanting to cut corners on trying to protect the citizens. I do not know. That is an open question, and we will have to have it examined, I suppose in your future hearings.

Mr. SCHEUER. Dr. Benton.

Dr. BENTON. Thank you, Mr. Chairman. I would like to draw——

Mr. SCHEUER. Can you give us especially your insights derived from your experience working with the weather service?

Mr. BENTON. I will try.

With regard to the entire problems, I would like to draw a distinction between contracting out and commercialization used in the way that it has been in the last few days, which involves the sale of satellites. What Mr. Johnson——

Mr. SCHEUER. Excuse me, if the witness will yield.

Dr. BENTON. Yes?

Mr. SCHEUER. Nobody has ever defined exactly what contracting out means. They have never said, have they?

Dr. BENTON. Well, I would like to draw a distinction between the various shades here, if I may.

Mr. SCHEUER. However, I find a considerable fuzziness in the administration's proposal to contract out the satellite services. They have not said whether they are going to sell them, they are going to lease them, they are going to give them management contracts. Do you know any more about the particulars of this package deal that we are apparently going to have to consider up here?

Dr. BENTON. I have not seen the particulars, Mr. Chairman. I view the prospect of looking at them carefully with some skepticism as to my reaction but I have not seen the details, and I certainly think we should await the proposal and look at the proposal very carefully.

However, I do think it is important to contrast the contracting out of specific jobs, such as those that Mr. Johnson has talked about, where we write a contract with RCA to build a satellite vehicle. That is a particular task that is set for the company. They come in, they agree to do it for a certain price, and American industry works wonderfully in that kind of a role.

I think that this kind of contracting out can sometimes be extremely beneficial and can increase the efficiency of the operation. I believe that the National Earth Satellite System in NOAA is one of the best-run Government agencies and technical agencies that I know of in this country. It did most of its work by getting private industry to do specific jobs for it but the control, the planning of the total operation, the ultimate control of the satellites, the ownership of the satellites if you will, remained firmly with NESS and with NOAA. It was the tasks that were farmed out.

Now what would bother me and make me very skeptical is if we start moving that kind of responsibility to industry. It raises many, many very, very difficult issues, international issues, as Mr. Johnson has mentioned. When we as a Government are meeting in the World Meteorological Organization with representatives of 157 other countries, the United States has to be able to say what it will do, what it can contribute toward a world weather system. We need the control of that kind of system in principal within the Government.

There are substantial issues that come up with regard to other matters. For example, who is going to insure the continued research and development and steady improvement of the system? If it is with industry, will industry—as they have in many cases—

only conduct this R&D and this development if it is going to pay them a profit. That I am very worried about.

We must have this R&D because the world of the future out there in meteorology, Mr. Chairman, is one in which the satellite will be right at the center of our activities, and we are very far from having a finished satellite service. The one we have today is far better than the one we had 13 years ago, and we are not doing our jobs as meteorologists properly if the one that we have 10 years from now is not far better than the one we have today. That sense of direction, the setting of priorities, I am very worried about relinquishing that to private industry.

Mr. SCHEUER. Just on that point, and then I am going to yield to my colleagues, we are part of a continuum, is what you are saying.

Dr. BENTON. Yes, sir.

Mr. SCHEUER. This is not a balance sheet; it is a series of annual reports. It is not a snapshot of any one time; it is a——

Dr. BENTON. That is correct, Mr. Chairman.

Mr. SCHEUER. What would be the effect on where we could possibly be, the potential for progress 5, 10, 15, 20 years down the pike, what would be the effect of putting this whole process in the control of the private sector?

Dr. BENTON. It could be very bad. It would have to be structured very carefully to avoid the deleterious effects, and I for one, as I say, I am skeptical. I would like to reserve the opportunity to see the proposal in detail, to ponder whether it really is carefully thought out, how it would handle some of these issues that we have raised here today. I am willing to keep an open mind about it but I am concerned.

Mr. SCHEUER. You are not really concerned about the ability of the free enterprise sector to perform assigned jobs, missions.

Dr. BENTON. Not at all. Not at all.

Mr. SCHEUER. What you are expressing special concern about is their ability to conduct, to create a rational long-term design for research, development, innovation, improvement in our current meteorological and satellite systems, I take it. I don't want to put words in your mouth.

Dr. BENTON. No. I have that concern, but let me say why I have that concern. It is because the benefits of these improvement are not just in the balance sheet of one company. They appear in the balance sheets of the citrus grower in Florida, of the farmer in Illinois, of the wheat grower in Kansas, of industry across our entire country, and the interest of every citizen in this country who wants to know what the weather is going to be for a million different reasons for his own personal use. This is where you get your payoff for good weather forecasts, not in the balance sheet of a particular corporation. That is what bothers me: How do we really interpret through one company this very complex set of assets that we get from good forecasting?

Mr. SCHEUER. Well, to be fair about it, it seems to me that if we were to embark upon this kind of transfer of responsibility to the private sector, basic to this whole design would be a responsiblity on their part and an obligation on their part to get the information out to all the potential users, and presumably there would be a little profit incentive for them to do that in an expeditious way, so presumably they are going to be looking to the market forces and they are going to respond to market forces on the part of the whole incredible variety of users.

We have expressed the concern that the small users—the small radio station, the small independent television station, the small newspaper, the ski resort operator in northern New York—they might be hard put to afford the service if the private enterprise firm doesn't have rate schedules for small users that are attractive and feasible.

However, leaving that aside, we have to assume that if private enterprise is given this mission and turned loose with it, that they will apply the same ingenuity and resourcefulness to analyzing the market and defining the market and meeting the market that they have done very successfully across the whole, broad spectrum of goods and services in America over a long period of time. What I have a special concern about is not their ability to analyze and evaluate and meet those market demands, but their ability or their willingness to conduct the long-term research and development that would be needed to bring us to the full fruit of progress, improving the system 5, 10, 15, 20 years down the pike that you envisaged as possible, were the planning and design of the long-term research and development under Government auspices.

I have sort of mixed feelings about this. We know that the supersophisticated space industry on the west coast, the whole Silicon Valley development, all of those research entities around Cambridge, Mass., they have done fantastic work in research and development. I have extraordinary confidence in the ability of private industry, once turned loose with the proper incentives, to do remarkable work in research and development.

The question is, Would they have the incentive here to make the long-term investment in R&D over the period of a decade or two decades, to bring us to the full potential of progress, within this format of transferring responsibility to them?

Dr. BENTON. May I make one comment, Mr. Chairman?

Mr. SCHEUER. Yes, please do, and then I am going to yield to my colleagues.

Dr. BENTON. I agree with you completely. I would like to make one addendum, however.

Mr. SCHEUER. Let me interrupt you for a second. This is the case that the administration has to make to us.

Dr. BENTON. That is correct.

Mr. SCHEUER. They don't have to prove to us that there is a lot of dynamism and creativity and brilliance out there in the private sector. We know that. We know that very well and we all believe in the experience that is perfectly obvious to us, that we are the most advanced nation technologically on the face of the Earth; that most of the technology and most of the innovation that the Japanese and the West Germans are applying so successfully, including the chip, the silicon chip, originated with us. We have given it to them on a silver platter, and I am not sure about the public interest consequences of our having given it to them on a silver platter, but that is a subject for another discussion.

However, there is no question about the brilliance and dynamism and creativity of the free enterprise sector, and I am confident that they could meet the current need, the current market for weather services. I have a reservation on the small users; we have talked about that. I have some reservations about how we institutionalize long-term incentives to give them the incentive to do the long-term research and development work that will achieve the full potential that you discuss, the progress that is there to be had.

It may be that they can do it just as well as the Government. Maybe we don't need a Manhattan type of approach here, with Government creating the grand design for the long-term research strategy, but I think this is the case the administration has to make to us.

Dr. **Benton**. I agree with your analysis, Mr. Chairman. I would, however, like to make one addendum which I think is important, and that is that I share with you your admiration for the ability of the private sector to create and to market. They can create a market far better than any Government agency.

One of the problems we have here is that if we are talking about the satellite service, that the real market for the satellite service is the Government because the market is for the total product for the forecast, and the satellite information is only one ingredient in the forecast, so what I worry about is that essentially we are saying, "OK, let the satellites be in the private sector," but the marketability of the output is basically to the Government because the Government then uses this information, plus information from radar, plus information from all kinds of weather stations, and puts the whole thing together to derive the forecast which is tremendously marketable, but the weather satellite information itself I think will have to flow to the Government.

Mr. **Scheuer**. All right. I apologize to my colleagues for having talked so long. I am not going to impose any time restrictions on them that I didn't impose upon myself.

At this time I am going to take the opportunity of recognizing our colleague, Congressman Ron Chandler of the State of Washington. We are delighted you are here. You will be recognized in just a few moments.

Now I would like to recognize Congressman Tom Lewis of Florida.

Mr. **Lewis**. Thank you, Mr. Chairman.

Well, gentlemen, you have quite a job. I feel you need all the help that you can get. For 4 years in the Air Force I was in weather research, right before the satellites started, but today we are still forecasting with drop sondes and with balloons and still using the satellites, and I think we have just scratched the surface.

You make a lot of good commonsense in your statements. I have some concerns, Mr. Johnson, where you were talking about the polar orbiters. Wasn't it about 3 months ago we had a satellite have a failure and it caused a lot of havoc out on the west coast in particular, in Congressman Chandler's area, Washington, Oregon, and the north part of California because they couldn't forecast at the time?

One of my concerns is with parking one in orbit and having one up there operational. That seems to me like a tremendous waste of money, unless we could develop a system that if one failed, we could get one up there in a hurry, rather than parking two and holding one in abeyance like a spare tire. Don't you feel that there is a tremendous cost problem there?

Mr. JOHNSON. Mr. Lewis, first I would like to clarify that I believe the failure on the west coast was of the geostationary satellite, and there was a limited blackout and still is. I believe that NOAA is planning to launch a replacement in the next several months.

The polar orbiter operated through that time. The polar orbiter is not used to do very short-range forecasting, like what is going to happen this evening. They use the geostationary satellite for that, and it is particularly critical on the west coast where you have the weather moving in off of the Pacific Ocean. Therefore, I would imagine that the short-term, short-range forecasting, like for tonight and tomorrow, did suffer and is suffering from that failure until that replacement gets up there. They have a tired and worn-out satellite that works during daytime only.

The polar orbiting satellite gives the big picture, the global picture that is used to produce the weather analysis charts that the forecaster uses to decide what his forecast is going to be for Seattle or wherever. It is needed more for the longer range forecasting, and as a basis for making the short-term forecasts, as George Benton indicated in his testimony.

Now turning to the cost question that you raised, Congressman Lewis, I agree that if we could launch a satellite in a few days' notice that would be the way to go. That presents very, very high costs in the launch vehicle area. One of the problems that NOAA has been suffering from for some time is the rapid escalation in the cost of launching, not so much the costs of the satellites.

I can recall when we launched our first operational satellite, the launch cost us $3 million. They are now costing, for the new Deltas, about $26 million, and some of the projections for shuttle launch—which is the policy of the Government to use—go as high as $90 million.

Now even with that rate of increase in the cost, it has required longer and longer lead times from the time that NOAA makes a decision for a launch until they can actually get a launch. The costs are almost prohibitive for the shuttle unless you do schedule it as long as 2 years in advance. With the shuttle it is also necessary to take several months to get from the shuttle orbit to the required orbit for the weather satellites. During that time the satellite is up there, you are waiting until it gets to its final resting place to use it.

Therefore, the tendency has been to go the other direction. You pay the price, yes, of having a satellite up there that in a sense is wearing out because it is up there, but overall when you look at the total system cost of the launching and the satellite, that is the less expensive way to go. I certainly wish it could be changed and I hope someday it is changed, but at the present time with the space technology that is available it does not appear to be a rational alterative.

Mr. LEWIS. Other than a consortium of countries, then, who in the private sector could afford to handle the satellite program such as you mention with a backup system?

Mr. JOHNSON. I really don't know who it would be. I think, as Dr. Benton pointed out, weather so far is a Government responsibility. I think that really is the starting point for any decisions about what might be done. One perhaps could review the question: Is it a Government responsibility? If the answer is still yes, and we somehow circumscribe what it is, then how would you meet that responsibility?

There is a very limited private market at the present time for weather satellite data, and I think that it is fair to say that the United States has the most developed private sector in meteorology of any country in the world. Most countries have none. It is all governmental.

Other countries and groups of countries are launching and operating weather satellites in consort with the United States. We freely exchange the data, at no cost, by the way. Through that kind of a cooperative program under the aegis of the WMO there is a sharing at the international level. Perhaps one can ask the question, whether the United States is taking on a larger portion of that shared cost than they should; that could be looked at.

Mr. LEWIS. I guess it was either Dr. Washington or Dr. Benton who brought out the fact that most all of the areas that are doing the forecasting now pick up most of their information from the governmental services.

Mr. JOHNSON. That is correct.

Mr. LEWIS. John Coleman is a good example, out of Atlanta. I guess he picks up the majority of his information both from the polar orbiting satellite information system as well as the equatorial type.

Dr. Benton, has the Department of Defense expressed an interest in the national storm program?

Dr. BENTON. Mr. Lewis, we have made a point of informing all of the Government agencies that have a legitimate interest in this kind of program. I have personally talked to representatives not only of NOAA but of the Department of Defense, of the Federal Aviation Administration and of several other agencies, simply because we wanted them to be totally informed about what we were thinking, what we were doing, and key people in these agencies have received copies of this report. I think they are very well informed about what we have been thinking, yes.

Mr. LEWIS. Thank you.

Dr. BENTON. Many of them have expressed considerable interest.

Mr. LEWIS. Thank you.

Dr. Washington, you mentioned some of the technologies available to improve weather forecasting: new radar, satellite improvements, and automated data collection systems. If we only had the resources to pay for one or two of these facilities, which would be your highest priority?

Dr. WASHINGTON. That's a tough one. The committee, when it looked at that came up with the conclusion that we are talking about roughly a $1 billion increase to implement this new technology, a total cost over the next 10 years or so. Therefore, when we broke that down, that turned out to be roughly something on the order of a 7-percent increase in the amount of money that is now going into those technologies in the Weather Service.

We felt in the final analysis, as Dr. Benton indicated earlier, that we should spend a small amount more to increase our capabilities. This is not really a time for major cuts in the Weather Service.

Mr. LEWIS. I see. Well, one further statement or question for all three of you: I want to speak for the general aviation pilots right now. I have a small airplane I fly around my district in, and I have never met so many fabricators in my life as the weathermen. Is there any way that you can do a better job for that little guy flying around in that single-engine airplane?

Dr. BENTON. Very definitely, Mr. Lewis. It is a matter, again, of better observation and better communications. This is modern technology. We have the technology. It will cost something to implement it but, again, it can be done. With our radar we can detect where the storms are; with our satellites we can detect where the storms are. The problem is doing that and then putting together the communications system to get that information to the user quickly, but if we set our minds to do that, we know how to do it. It is given, state-of-the-art technology.

Mr. LEWIS. I see.

Dr. WASHINGTON. I wonder if I can add something to that? Just to give you an example, the radars that are presently being used by the Weather Service are roughly 25 years old, and they certainly are not taking advantage of the new sort of technology, the Doppler capability, to give you really detailed storm information. If we were able to implement this type of technology, I think that we could help the pilots out.

Mr. LEWIS. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you, my colleague.

Since we have been joined by three Congressmen, in order to finish this afternoon we are going to have to go back to the 10-minute rule.

I now recognize Buddy MacKay, also of Florida.

Mr. MACKAY. Thank you, Mr. Chairman.

It seems to me, Dr. Washington, that you chair an advisory committee which was created for the purpose of advising the Congress and the executive branch on this specific kind of question, and that your committee did a report last year in which you recommended almost contrary to this policy. Is that an accurate summary of your report?

Dr. WASHINGTON. Yes, I would say so, although for some of the aspects of the commercialization, we did not feel that we went into it far enough. I think that aspect we would like to address in more detail at some later time.

Mr. MACKAY. As I just hastily scanned your statement and the summary of the report, it seemed to me that you said the gathering of the data should remain a Government function; that it could only be done effectively if you could integrate all of the data that came in, a good bit of which did not come from radar, some of which came from other countries who had no mechanism to exchange data with somebody that was charging them. The whole concept of commercial use of that, plus aircraft sightings and ocean vessel sightings, did not seem to fit within that context. It seemed to me you went far enough to say you didn't see how that would work.

Dr. **Washington**. Yes. I think we still are openminded about it, but we felt very strongly that the Weather Service is the integrator of all of these various types of data, and it has to be done in one central place. You can't really have some person or some organization doing one part, another organization doing another part, and try to fit it together at the end, at the forecast end. What we are essentially talking about is the acquisition of the data, the preparation of analysis and forecast, and then the final step is the dissemination. I might add that the dissemination is mostly done in the private sector.

Mr. **MacKay**. Therefore, you could actually have a great deal of commercialization in the analysis—and in fact there already is—and a great deal of commercialization in the dissemination, but in the gathering of the data you don't see that as appropriate for private.

It seems to me—and this, I would like to get comments from the three of you—it seems to me that Government could end up actually paying more as a result of commercialization.

Dr. **Washington**. Well, that is possible, although, as I say, we haven't examined any hard numbers that would tell us one way or the other.

Mr. **MacKay**. All right. Thank you very much.

Mr. Chairman, I have no further questions.

Mr. **Scheuer**. Thank you very much.

Congressman Rod Chandler of Washington.

Mr. **Chandler**. Thank you.

When Congressman Lewis was talking about the failure to predict the weather in the Seattle area due to the satellite problem, I had to chuckle because you can't predict the weather there, no matter what you have.

However, Dr. Washington, I tried to quickly review the booklet here. Should I perhaps address the question to Dr. Benton? Is the estimate of $1 billion for the storm system? I did miss your testimony, and I apologize, but I would be interested in knowing more about that, what we would be buying, perhaps just some more detail.

Dr. **Benton**. Mr. Chandler, what we basically are saying is that the time has come to pay much more attention to the small-scale weather system that causes our inclement weather and most of our difficulty in terms of the impact of weather on agriculture and industry and on government. Our program, which is a 10-year program which would cost about $100 million a year or $1 billion over a 10-year period, is a program which would permit us to introduce new technology for observation, for data collection, and data dissemination, and new research to help continue to improve the system over time.

If you look at the "call to action" document, you will see that we have made some estimates of the value of this forecast, and we think that there is conclusive evidence that the value of such an improvement in our weather forecasting services and supporting research would far outweigh the cost. We suffer, on the average, $20 billion a year of damage due to bad weather.

We have made the estimate in our committee that an improved short-range forecast system, such as the type that I am speaking of, could reduce this at least by 5 percent, which would be $1 billion a year for an investment of $100 million. That totally leaves out the increased benefit to the public, the increased savings in terms of loss of lives and reduction of injuries to people who are affected by weather directly, and the increased efficiency in agriculture and industry, where no losses are involved, where you simply get more efficiency by using weather forecasts as part of your operational procedures more effectively.

We believe we have made a very cogent case for spending this money. As I said at the beginning, my thesis is not to defend against cuts but to say that this country is not doing well by its citizens, by its industry, and by its agriculture, if we don't substantially improve our weather services.

Mr. **Chandler**. I think the point you make about it paying for itself is an important one. Obviously if there had been greater warning of that tornado, you might have saved some lives or injuries but you are not going to save homes because you cannot move them, get them out of harm's way.

However, at the same time you are saying that we would have better weather information, better forecasts for—as I think Mr. Johnson was saying—what is going to happen tonight or tomorrow morning, as a result of what you are talking about here.

Mr. **Benton**. Yes, sir, we can. One of the reasons we are so certain of this is because, for example, the technology is in hand. Dr. Washington spoke of the fact that the National Weather Service has a national weather radar net in which the radar were built 25 years ago. They are not only model T's, they are earlier than the model T's in terms of what is available today.

We have built and tested very carefully in our research programs, modern radar which will run rings around the radar that the Weather Service is using in terms of identifying storms, enabling you to say where they are, how they are moving. I believe that this country has sold its citizens short because very often we spend a great deal of money developing wonderful new technology, and then we shrink from using it, and we wind up exporting it to other countries who gratefully use it. Why don't we use this technology for ourselves?

Mr. **Scheuer**. That is remarkably interesting testimony, Dr. Benton.

My colleague from California, George Brown.

Mr. **Brown**. Thank you, Mr. Chairman.

Gentlemen, I apologize because I was late getting here and I didn't have a chance to hear your testimony. I imagine my questions will be redundant to some extent.

However, since at the top of all of our minds right now is the action announced today for the proposed privatization of the system, at least major portions of the weather system, the satellites, data acquisition systems, I would like to inquire—I won't ask you to say what your personal views are on this—but to the extent that you can, can you make a judgment as to how this action would affect our status within the world meteorological community? What disturbances, what difficulties would be caused if we were to proceed with the privatization of our weather satellites, and perhaps other portions of the system, and how would the rest of the world react to this? Can any of you offer a response to that question? Do you want to try, Mr. Johnson?

Mr. JOHNSON. It depends on how it would be done, of course. I can say that, having just attended a meeting at the World Meteorological Organization in Geneva where there were representatives of nearly 100 nations and they learned for the first time the possibility that this would be proposed, their reaction was one of disbelief. They just didn't see how such a thing could ever happen.

I think they really had come to take it for granted that those satellite data would always be there. Indeed their weather systems have been configured to take advantage of the data in such a way that they probably would find it very difficult to do without it. The concept to them of a weather function, a major weather function, not being a governmental function is just impossible to understand. They cannot accept it.

As I think I mentioned earlier, we are probably the only Nation with any kind of a sizeable private weather community, people who use the Government data to render specialized service. Now what would this mean to them? You can't really answer that question directly because we don't know yet what the Government proposes or what will actually come to pass.

If indeed the weather satellite system were to be really commercialized—that is, there would be no Government strings, no Government control, the Government would not make the data available to others once they had gotten it from the company—then presumably all the nations in the world would have to form a line and see what kind of a deal they could strike with the company. That, I suspect, would lead to a great deal of difficulty, politically certainly.

Secondarily, it should be remembered that there has been free and open exchange of weather data among all the countries of the world for more than 100 years. That today does include the weather satellite data of Europe, the Soviet Union, Japan, and now India, where those countries and organizations provide the data at no cost to the United States and we do the same.

I suspect, from what I have heard, that should this situation that I have defined ever come to pass, it would no longer be available to us free of charge. In fact, an official of the Canadian Government said that they would seriously have to consider charging us for all of the data coming south from Canada, and I just don't know what the northern tier of States—including Seattle—is going to do, should that happen.

Now I would assume that that scene I have painted will not come to pass. I would not expect that the administration would propose that. I have heard that they may propose giving NOAA the money that would be required to fund the contractor to make the data freely available to other countries. I would have to view that with some skepticism. Having been in the administration, I know what happens each year when OMB starts to work on budgets. I wonder how long that position would be retained.

Therefore, I think it could be a very complex and serious issue, but it does depend on how it is handled.

Mr. **Brown**. Well, I am very interested and I think the committee is interested in the process which lay behind this recommendation or action on the part of the Executive Office of the President. None of you gentlemen are currently in the Federal Government, are you? Were any of you consulted in connection with this recommendation?

Dr. **Benton**. No.

Mr. **Brown**. I rather get the impression that the Weather Service was not consulted too much, but I'm not sure about that. Perhaps we can find out from them.

I think one of you mentioned in your statement that the state of research and development with regard to new sensors, new systems of disseminating data and so forth, was somewhat less than optimum, that we are not investing enough in this particular area. Am I correct in this? Is it your feeling that privatization of the system would lead to a higher level of investment in the system, or is it likely to continue—if your statement is correct—to operate at a lower level of investment in research and development for improving the system than it currently is? Could you speculate on that?

Dr. **Benton**. Mr. Brown, I think that this is one of the areas where I would have very serious concerns. If we were to move in this direction, it would certainly be necessary for us to consider very carefully how improvements, continued improvements of the system, could be made. It is not just a matter of funding the sensor and instrument research. It is involved much more broadly in setting directions, in setting priorities. What are the kinds of equipment we most need? These kinds of choices are intimately bound up with the whole direction that weather services themselves are going.

The only way I could see to assure this would be appropriate funds to some Government agency, presumably NOAA but some Government agency, to contract for the necessary R and D, because I just personally don't see how else it could be done. If this were done as part of a total package, it would be an effort to cope with one of the difficulties, but again I am concerned—as Mr. Johnson is—whether under the pressure of budgets at some future time some OMB might not decide that this is an area that can be saved because it really should be done by the private sector. In that case, I think we would lose our ability to do the job that needs to be done.

Mr. **Brown**. Did you want to comment, Dr. Washington?

Dr. **Washington**. Yes. I would just like to add one point, and this is to emphasize that when you come down to the requirements for improving the forecasting capability, often you have to make many trade-offs: Should we have more satellite data, should we have more radar data, should we have more conventional data? I think that the people who are in charge of the total operation, the integrated system, are the ones that really can set those priorities. If one part of it is immune to either increases or cuts, it is going to be very difficult because you are going to have to deal with that first, and you may get a degraded end product by treating these as all separate entities.

Mr. **Brown**. Well, I don't think that there is any major objection in the Congress to the commercialization of any services that the

Government is now providing, as long as there is some reasonable assurance that will lead us to be able to conclude that the public will continue to be served in hopefully an even better way than it has in the past, but there seems to be a problem in this administration in making that kind of a determination. They seem to want to leap by an act of faith into a commercial future without really understanding whether or not the public will be better served. We are not here today for the purpose of going into that in depth but I think we are all interested in getting any reactions that you might have on this situation.

Mr. Chairman, I have no further questions at this moment.

Mr. SCHEUER. I thank you very much, Congressman Brown.

Thank you very much to the panel. You have been enormously helpful and we have enjoyed your testimony very much.

We will now hear from Mr. Leo R. Harrison, president of the National Weather Service Employees Organization, accompanied by Mr. Jeffrey Bowman, meteorologist in the Washington, D.C., Weather Service Forecast Office.

We have heard from high-level policymakers and administrators, and now we look forward to hearing from the day-to-day field experts, expert in field operations and the realities as they exist out there.

We would ask both of you to chat with us informally for not more than 5 or 6 minutes each. Your prepared testimony will be reprinted in full at the appropriate point in the record, so we hope that you will just chat informally with us.

Mr. Leo Harrison.

STATEMENT OF LEO R. HARRISON, PRESIDENT, NATIONAL WEATHER SERVICE EMPLOYEES ORGANIZATION, ACCOMPANIED BY JEFFREY BOWMAN, METEOROLOGIST, WASHINGTON, D.C., WEATHER SERVICE FORECAST OFFICE

Mr. HARRISON. Mr. Chairman, we appreciate the opportunity to appear before this subcommittee today.

As you have indicated, this will be a view from the trenches, and I will let Mr. Bowman lead off. We are both full-time forecasters with the National Weather Service.

Mr. BOWMAN. Good afternoon, Mr. Chairman. I am a general forecaster employed by the National Weather Service right here in Washington, D.C. I have been with the Service for 15 years and locally for 7 years. I have become experienced in a variety of forecasting responsibilities here. At the present office this includes public forecasting, aviation forecasting, marine, agriculture, and infrequently hydrology, fire weather, and air pollution.

The products vary from routine issuances to advisories, special statements, watches, and warnings. Our products are routinely communicated to the public, the mass media, and users such as ship captains and farmers. To serve the recipients of our products, the forecasts must be timely and accurate. To meet this need we have satellite pictures, surface and upper air observations, special observational networks for rivers, severe weather, and winter weather. We have radar observations and computer guidance.

As long as the input to our forecast is good and reliable, the forecast should be timely and accurate. Of primary importance in forecasting is the alerting of weather situations that are life and property threatening. This is where our expertise is most needed. Such forecasts are those involving tornados, severe thunderstorms, hurricanes, and flash floods. This is our invaluable service.

Taking you back just a few weeks, I will give you an example of how a forecast is made. This was not life threatening but still a service, and also saved some money.

On the previous midnight shift, the public forecaster made a forecast of travelers' advisories for 1 to 3 inches of snow for the Washington, D.C., area for that day. On my arrival he briefed me on why: He said a coastal low was expected to influence the area today and give a light snow accumulation. Our computer guidance indicated this, and the movement of the snow by radar observations and surface observations showed this trend.

About an hour after I started, the trend changed. The satellite movement of clouds shifted to the southeast. Radar depicted decreasing snow shower activity and surface pressure rises were being observed in the area. Also, some of our key observers noted just snow flurries and not snow. Upon analysis, the low appeared to be taking a more easterly track. The forecast looked like a bust.

Talking the situation over with my colleagues in marine and aviation, agreement was reached: Take down the travelers' advisories and limit the snow to flurries. Next, a special statement was written up and dissemination indicating the change in the upcoming forecast. This necessitated coordination with the affected Weather Service offices and adjoining forecast offices.

Then the phone calls came in: What do you think? Aren't you going to change the forecast? One radio station chewed us out, only to apologize and say, "Gee, I guess I better get off this phone so you can do your forecast."

After all this, a guidance package was made up on our big board for coordination and this, with our forecast in use, was to be used by our observers and all the other forecasters. Zone forecasts were also prepared in these areas of climatology that are similar in the area, and they were disseminated to our Weather Service offices and cable users.

Next we had our Washington, D.C., and vicinity forecast. This was only 45 minutes late. The rest of the 8-hour shift included keeping a constant weather watch on the low and the snow, making sure that no more updates or special statements would be needed. These are just some of the highlights of a routine public forecast day shift.

Thank you.

Mr. HARRISON. Mr. Chairman, I would like to address my remarks to the proposed reductions in the fiscal year 1984 NOAA budget, with the associated implementation of OMB Circular A-76, and their related effect on National Weather Service Operations and the long-term trends in the number of personnel in the NWS.

The abolishment of the southern region will not be an efficient operation administratively, and is a nonsound decision for several technical reasons. The central and southern regions are constituted of two distinctly different climatic zones.

The greatest difference is that much of the southern region is subtropical. The southern region has a significant marine responsibility; the southern region frequently has the threat of hurricanes, where the central region is seldom affected by all the aspects of a hurricane. The southern region has a technical expertise in these areas that would take many years to develop.

The U.S. Government is the main beneficiary of the fire weather program. Most of the forests covered by this program are Government owned. This laxity toward the preservation of this resource by the present administration is an extension of their general disregard for the environment.

The curtailment of the agricultural program is a case of gross mismanagement. No reasoning organization would eliminate a function that returns $30 for every dollar invested. The reduction of personnel of 21 WSFO's, the downgrading of 8 WSFO's to WSO status, and the cuts in community preparedness will probably set the stage for the weather disaster that may bring attention to the deplorable condition and delicate state of the field services and the present warning system.

It seems a little inane to be appropriating millions of dollars to conduct research on how we can improve local warnings for 5 to 10 years from now, while eliminating our capability to provide this service today. Congress has charged the NWS to provide weather forecasts and warnings to the public. On balance, every proposed reduction in the 1984 budget cuts directly into the ability of the NWS to discharge its responsibilities.

On the subject of OMB Circular A-76, the story this week concerning the administration's intent to dismantle the Weather Service may be somewhat premature in the way that it was reported, but this subcommittee should be concerned that the timeframe to use is the only error by the reporters. We hope that members of this committee will alert their colleagues that this abolishment of the NWS is a real threat. The Congress alone can prevent this. If the Congress is not disposed to the preservation of the NWS as a viable public forecast and warning system, then it would be left with only one rational act, and that would be the complete elimination of any Federal participation in public weather forecasting.

Anyone who has followed the trend of the NWS is fully aware that since the Weather Bureau was changed to the NWS, the agency has continuously gone downhill in terms of human resources and in terms of the percentage of the NOAA budget that has been allocated to public weather services. We know there is a reluctance on the part of Congress to get involved in Federal agency behavior and policy, but someone in Government must assume responsibility for the continuation of this degenerative trend.

The GAO audit of the program should certainly have inspired further investigations. Someone must curb the unfettered and pie-in-the-sky research that has become welfare programs for Ph.D.'s. The taxpayers and the public are being billed by the management practices within NOAA. They are paying for the best possible quality of weather forecasting; they are not getting what they pay for.

[The prepared statement of Mr. Harrison follows:]

TESTIMONY OF:

Leo R. Harrison, Jr.
President
National Weather Service Employees
  Organization
Washington, D.C.

Before:

Subcommittee

on

NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

HOUSE OF REPRESENTATIVES

UNITED STATES CONGRESS

March 9, 1983

The field operations of the National Weather Service (NWS) have suffered over an eighteen year period from: 1) poor policy decisions and management actions totally unrelated to public service; 2) austerity programs imposed by every level of the bureaucracy from the NWS Regional Directors to the Office of Management and Budget, including a ten year financial drain caused by the implementation of the AFOS system and a constant shifting of budget priorities; 3) "fair-weather" staffing, the constant addition of new programs coupled with a continuous loss of the employees needed to staff these new programs; and 4) repeated abuses of merit promotion practices, and the deterioration of morale among field employees. NWS employees continue to function under these conditions mainly because of strong self respect and professional pride in their products and services. Thus, two factors continue to save the field programs of the NWS. These are, employees dedication to service, and the support we have received from the Congress.

The agency has been a haven for the many academics wishing to qualify for a federal pension while they carry out their favorite research programs. Also, NOAA has served as a summer home for the many top level military retirees brought into the agency by their "buddies" to enhance their military pensions. Most of these individuals are immediately placed in top policy-making positions and have little comprehension of the system over which they make policy. While they may have vast experience in defending the public, they have little experience in public service, field forecasting or the agency's mission as defined by law. Lacking this experience and understanding they redefine the mission with their policy making to suit their backgrounds. While they may operate with the best of intentions, these high paid retirees have caused a considerable sense of frustration for the career aspirations of field employees. These ex-officers have formed management circles that have almost totally excluded the careerist and any management contribution that might be made toward a more balanced organization, improved programs, and a sense of purpose within the agency.

Since the time of Dr. Reichelderfer, the National Weather Service has lost its strong direction from the national level. Each Regional Director tends to operate as an independent National Weather Service. While one director may emphasize a particular program, another may well eliminate the same function. One director may advocate involvement in flash flood forecasting and another director may take the position that it is impossible to forecast such events. Often,decisions are made based on the notion that the computers are the answer to most problems in operational services,therefore, human input and interaction should be confined to research. The research types have made most of this policy. Other decisions are made based on internal or external political considerations to accommodate the private meteorologists.

Decisions are made in order to placate the academic interests of the scientific community. Decisions are made simply because NOAA or Commerce directs them. Some are made in the name of creating a more efficient operation. The definition of what is efficient is based on the values and purposes of the person making or directing the change and only rarely are the benefits to the general public or a special meteorological user a consideration.

Superimposed on this work environment are actions and proposals under which hundreds of field personnel for over three years have been under threat of major agency RIFs. For nearly a year many shift workers have not received their premium or overtime pay on time. Also, these workers have been exposed to six years of attacks on the federal system. These attacks threaten their careers, their pensions and the security they worked to achieve for themselves and their families. There are many NWS retirees who must wait months with no income, just to receive payment of their leave balances when they retire. The same Management Service Center in the Department of Commerce that does not meet its payroll deadline also fails to service those who retire. The irony for retirees is that until they receive their annual leave payments, OPM will not process their retirement pay.

Over the last twenty years people-based field services have suffered in order to acquire the ever larger computers needed to search for that meteorological "Holy Grail", the perfect computer forecast. For example, observational networks were reduced as a way to help pay for these computers. The rationale here seems to be that with perfect computer guidance products there is no need for local observations. Now, however, the National Weather Service, the Environmental Research Laboratories, the National Science Foundation, and the National Center for Atmospheric Research are spending millions of dollars annually to develop data networks so dense and sophisticated that it is ludicrous to believe that they could be implemented except as a research project. The price tag to implement these networks operationally would be in the billions of dollars. Nonetheless, millions of dollars are to be siphoned off annually to continue this research.

A few years ago, Professor Ramage, a Ph.D. at the University of Hawaii, stated that the law of diminishing returns now applies to proposals to further increase the use of computers in weather forecasting. The latest report from the National Advisory Committee on Oceans and Atmosphere (Attachment A) recommends even larger computers. Other, more reasoned approaches by C.B. Priestly and Richard Augulis (Attachments B and C) suggest a greater emphasis be given to mesoscale analysis and improved local diagnostics using existing technology that will yield greater improvement in the local forecasts.

For nearly two decades the forecasters have been discouraged from deviating from central guidance. Individual excellence in forecasting receives little reward within this computer oriented system. The role of the computer must not be challenged. The fact is that human input can improve on the computer model guidance at every level of forecasting. Another fact is the computerized LMF has not shown meaningful improvement since 1976. In spite of this it is rumored that the Basic Weather Branch (Attachment D) of the National Meteorological Center (NMC) will reduce the issuance of manually- derived products which are essential for such meteorologically untrained weather users such as the FAA pilot briefers. Computer LFM and spectral guidance, which can only be used by trained meteorologists, is proposed for such users in lieu of these manual products. On page 101 of the proposed 1984 NOAA budget it is indicated that six positions in NMC research will be eliminated. Instead, it is more likely that important operational positions will be eliminated. Additional cuts in NMC will involve, initially,staff reductions in the reproduction unit, and subsequently,the function will be contracted out. Attachments E and F demonstrate the bias of computer-based research over operations and public service. A memo (Attachment E) to Mr. LaPorte (MIC WSFO Washington) states that no chart copies will be available after April 15th, 1983. Another memo (Attachment F) sent to a number of research sections states that copies of charts will be available if deemed necessary. Mr. LaPorte supervises the Washington Forecast Office which prepares the public forecasts, the aviation forecasts for the states of Maryland, Delaware and Virginia and the marine forecasts for the North Atlantic. Many charts necessary for the preparation of the marine forecast are unavailable from any other source. The subcommittee should also be aware that the Forecast Division of NMC is operationally oriented and has sustained an eight percent cut over the last two years. The Development Division which is research oriented during the same period received no cuts.

A proposed merging of the Satellite Field Service units with the NWS (Attachment G and H) will result in more decreases in field operations. Once again the NWS takes on a program responsibility which it is expected to maintain at the present level of service with a reduction of nearly 40 percent of the program's present staff. If past trends continue we will see further cuts in staffing and the present forecasting staff will be expected to assume an additional burden.

In FY 82 Congress approved the establishment of four (4) Ocean Service Units (OSU). Only one of these has been staffed and operating as intended by Congress. An increased level of communication between marine users and NWS forecasters has proven to be very beneficial from a financial, as well as, from a safety viewpoint. However, in some units the picture is quite dismal. For example, the positions at the New Orleans Forecast Office were advertised and cancelled before being filled. The activity along the Gulf Coast and the Continental Shelf requires focused marine weather forecasting and if implemented could show a high benefit to cost ratio, yet the program languishes. Congressional directives have not received follow-up attention from NOAA.

To realize savings from AFOS in the area of communications, the agency has been directed to curtail certain existing communication circuits (Attachment 1). However, AFOS is not reliable enough to be operated in periods of severe weather without a backup teletype capability. Many stations still experience numerous crashes, and experience extended periods of down-time. Many Weather Service Offices operate without spare electronic boards that are vital to the AFOS system. If a disc drive fails there is an automatic two-day outage. Many WSO's do not have emergency power. Even those WSO's and WSFO's that do have emergency power in many cases do not have control of this backup requirement, nor does the emergency power support the computer's air conditioning.

On page 99 of the NOAA budget request, there is a proposal to cut staffing at twenty-one (21) field offices. These cuts are being proposed in spite of the fact that staffing has already been reduced at every station in terms of the decreased time on each shift for applied meteorology. This is because a significant portion of work time on each shift must be given (diverted) to resolving computer and communication problems caused by the afvent of AFOS. These problems involve computer operation, computer and communication system diagnostics and reprogramming in order to get products to media users, special users and the general public through AFOS.

In a recent article in "Sea Technology", Larry Booda indicates that the meteorologists have dominated NOAA administration for the last decade. This may be true but that dominance certainly has not been reflected in the quality of service to the weather users or the level of aviation safety in terms of improved forecasting. Any organization that recommends the curtailment of such beneficial programs as the agricultural forecast program does not have its priorities in order.

Presently, NOAA leadership has commissioned a consultant firm, at a cost of nearly one-quarter of a million dollars, to study ways to gain more "cost effective" operations in the NWS. This so called"Winchester"study is in effect a "cover" to dignify station closures and personnel reductions in field operations and related public service, implement A-76 contract out provisions, and establish user fees that would require the American people to pay their government for certain services and information or do without.

The National Weather Service Employees Organization believes that sufficient funds are being expended by the federal government in the area of meteorology. How these funds are used remains a significant problem. There is much duplication of research. There is too much emphasis on research and not enough funds for providing good public service through the utilization of existing knowledge and technology. As Priestly so aptly responded in attachment B that future progress in meteorology will occur in whichever area management chooses to provide funding, i.e., management decisions will become self-fulfilling prophecies. In attachment K, (a position paper that was sent to every member of the Congress several years ago) our organization proposed an alternative. This alternative has been supported by others in the meteorological community.

Finally, lacking any other recommendations to consolidate and efficiently utilize the nearly one billion dollars that is presently being spent on the many fragmented and uncoordinated meteorological efforts, the Congress should at the minimum establish an Organic Act that defines the role and responsibilities of the National Weather Service within a national program.

Mr. **Scheuer**. Thank you very much, Mr. Harrison.

Mr. Lewis?

Mr. **Lewis**. I have a few questions for you, Mr. Harrison. First of all, I would like to ask, you are a weather forecaster?

Mr. **Harrison**. I am a hydrologist. I am a flood forecaster.

Mr. **Lewis**. That is your overall background?

Mr. **Harrison**. My overall background? I began as a forecaster in the Navy during the Korean war. I came into the Government in 1961. I started as a technician. I took credits at night and enhanced my education, and became a professional hydrologist in 1972.

Mr. **Lewis**. You heard Dr. Benton and Dr. Washington? You were here during their testimony right before you?

Mr. **Harrison**. Yes.

Mr. **Lewis**. They both recommended up to $1 billion be spent over the next decade to provide the Weather Service with space-age technology. What is your view on their recommendations?

Mr. **Harrison**. I would have no opposition to that expenditure, as long as it did not cut into the present capabilities to provide forecasts to the public today.

Mr. **Lewis**. I see. What do you think specifically is being done to protect the public safety and to improve weather forecasts today?

Mr. **Harrison**. There has been very little done in this area, as far as we at the working level are concerned. Most of the money has gone to the research areas, and much of this research does not affect the operations of the day-to-day forecasting.

Mr. **Lewis**. Are you speaking of—well, let me ask you this question first: Do you do long-range forecasting as well as short-range?

Mr. **Harrison**. Our office is primarily the first 48 hours and that is our main responsibility. We do issue extended forecasts and on occasion we will try to look into the future and help particular users if they are trying to plan something, but it is only in a general sense.

Mr. **Lewis**. Where do you get your information from to disseminate a forecast?

Mr. **Harrison**. Most of our guidance for the forecast comes from the computers in the National Meteorological Center. We assimilate that guidance, the formulas that have been run through the equations, the derived models. We look at the satellite data; we look at radars; we take a look at all the hourly observations that are available to us. In many cases, particularly in flash floods, we have developed our own small micronetworks to help us make flash flood forecasts. We have to assimilate all these things and make a decision.

Mr. **Lewis**. I see. You made reference to the A-76 process as applied to the Weather Service. You gave part of your views on that. Do you have an overall view on that?

Mr. **Harrison**. Yes. The A-76 that will become implemented on May 1 is a license for the administration to farm out any aspect of practically any function of Government without any cost justification. Formerly there at least had to be a cost justification. We have seen some figures that have been fudged tremendously to justify these decisions, and our own union has tried to attack these several years ago when the contracting out of the weather observation stations was begun. We spent over $4,000 trying to get a rational evaluation of this and honest figures. However, the new A-76 does not even necessitate a justification.

Mr. SCHEUER. If the witness will yield, I wonder whether you could get us a copy of these figures that you characterized as "fudged," along with your analysis of those figures? I think that would make a very interesting improvement to our——

Mr. HARRISON. Yes. Those figures are right next door in the Longworth Building, so there is no problem. We presented a comprehensive report to the subcommittee on Human Resources before the Post Office and Civil Service Committee, and we made all this data available to them, and I am meeting with the people from that staff tomorrow.

Mr. SCHEUER. You analyzed those figures?

Mr. HARRISON. Within our capability—we are not auditors or accountants—we have gone through these and we have been able to point out and I have testified where the figures are exaggerated grossly.

Mr. SCHEUER. I yield back to my colleague.

Mr. LEWIS. Thank you, Mr. Chairman.

Do you believe that the public safety warnings have deteriorated as a result of continued budget and personnel reductions in the National Weather Service?

Mr. HARRISON. The overall budget, I think I stated here, this has not been a reduction in the NOAA budget. It has been a percentage reduction as to what goes to public service within the National Weather Service. There is where the real reduction has taken place.

Under this proposal yesterday of commercializing the satellite information, I could envision a situation where a significant number of dollars will be extracted from the NOAA budget, no longer available, because it would go to the contractor, yet we would then be asked to maintain the same level of service. However, the priorities within the agency itself would still lean towards the research into the future and not toward the service to the public.

Mr. LEWIS. Do you think that the public safety has deteriorated?

Mr. HARRISON. It definitely has. It is operating on a very marginal basis right now. These 21 stations, forecast offices, that are proposed for reduction, we have already suffered a reduction in the last 2 years within these stations that is not part of any budgetary request.

We had been given an AFOS system—I don't know if you are familiar with the term AFOS, the automation of field operations—a computerized system that began in 1973. Only last year was this declared operational at millions of dollars of cost overruns and many, many more dollars in the GAO account that could not even be computed. This system does not work.

What happens in meteorology, when your system has the most requirement upon it, that is also the time it has the most stress as far as instrumentation, and when you have the most severe weather is at the very time that your equipment fails on you. We have these forecasters like Mr. Bowman and others like him all over the country that have to divert their attention from making the forecast, at very critical times, to try to reboot a computer so they can get back in touch with the users and disseminate their forecasts.

They have to drop their forecast, go over and reboot the computer, take 10 or 15 minutes, hope it comes back up, and then go back and try to concentrate on their forecast.

Mr. LEWIS. Well, computer failures are a fact of life these days. Public safety, as we continue on through life, is going to be more and more at the beck and call of the computer.

Let me ask you this, Mr. Harrison. You say you are a forecaster. Are you in a supervisory capacity?

Mr. HARRISON. No, I am the president of the union. I couldn't be a supervisor and personally I wouldn't be a supervisor.

Mr. LEWIS. Why not?

Mr. HARRISON. Supervisors within the Weather Service do not have the latitude to supervise or manage, really. I have been a manager in private industry, and the supervisors in the Government do not have the latitude that a private industry supervisor has.

Mr. LEWIS. Well, thank you, Mr. Harrison. My time is up.

Thank you, Mr. Chairman.

Mr. SCHEUER. Congressman George Brown of California.

Mr. BROWN. Mr. Harrison, it is a little unusual to have testimony presented by a representative of the employees' organization, not unique, but a little unusual. May I assume that your organization feels that the Weather Service is in a situation which demands that they express their views to the Congress with regard to what is happening, or that there is some other major motivation behind this? You don't consider it a routine appearance, do you?

Mr. HARRISON. No, this appearance of an employees group is long overdue. We have attended hearings in the past where management comes in and gives their viewpoints, you people listen to those and that is what you have to base your decisions on, but as I think we are indicating in our testimony, the viewpoints of the employees, the people who are in the trenches, are completely different on many occasions as to what the real operation is like.

Mr. BROWN. Were you required to have any kind of official clearance or approval before appearing here, or is this within the scope of your responsibilities as the president of an employees' organization?

Mr. HARRISON. Yes, I think we are operating within a protected right.

Mr. BROWN. Was your testimony cleared by OMB?

Mr. HARRISON. No, our testimony is not cleared by anybody. [Laughter.]

Mr. BROWN. Mr. Harrison, I detected—and perhaps I was wrong in this—a certain bias against the high technology and the expenditures of money for at least certain kinds of research and automation. I wonder if you could clarify a little bit the attitude that you have or the employees' organization has with regard to this. I wouldn't want the record to improperly reflect what you are trying to get across here.

Mr. HARRISON. No, we are not prejudiced against research. Our people are scientists also and we realize and appreciate the value of research. However, what we are saying here is that priorities have been imbalanced within the Weather Service. Our people are a very altruistic group as far as trying to serve the public, and they have a very dedicated purpose in serving that public, and we do not feel that the dollars have been spent in balance. The priorities are out of balance.

Mr. **Brown**. In other words, you are putting the first priority on improving the service to the public through the professional abilities of the employee.

Mr. **Harrison**. The safety of the public and of the flying community and the cost benefits that we could provide to the agricultural community should have first priority when the dollars are being doled out.

Mr. **Brown**. I presume, but I would like to have you restate it, that you feel that it is unwise to terminate and downgrade the agricultural and forest fire protection services and similar services that are threatened or drastically reduced in the proposed budget.

Mr. **Harrison**. Certainly. I think that even the figures I used, after hearing the previous three witnesses, my figures are very conservative compared to some that were presented by them.

Mr. **Brown**. Have you had an opportunity to make a public statement on behalf of your organization with regard to the President's announced decision to privatize the satellite service?

Mr. **Harrison**. Not in the form of a general press release. I have made statements to some of the media from different parts of the country in the last 24 hours, but we are a very small group.

Mr. **Brown**. Could you just summarize the views you have expressed?

Mr. **Harrison**. I have an example——

Mr. **Brown**. We can clean it up if necessary. [Laughter.]

Mr. **Harrison**. The example I would use is, it would make as much sense to sell the Washington Monument to some contractor and then rent it back so that we could let the public go in for free.

Mr. **Brown**. Do you think that is a good example?

Mr. **Harrison**. I think it is a good analogy.

Mr. **Brown**. I have no further questions, Mr. Chairman.

Mr. **Scheuer**. I thank the two witnesses very much for their splendid testimony and their very perceptive insights. Thank you very much.

It is now my high honor and splendid privilege to introduce our distinguished colleague from Florida, a man of high principles and proven altruism, who will now introduce the last witness.

Mr. **Ireland**. Thank you, Mr. Chairman. I am glad to wear my altruistic tag with great honor here this afternoon.

Mr. **Scheuer**. No less than the prior witness.

Mr. **Ireland**. Absolutely.

With your permission, Mr. Chairman, I would like to submit a brief statement for the record on my own account.

Mr. **Scheuer**. You are asking unanimous consent?

Mr. **Ireland**. I would ask for that.

Mr. **Scheuer**. There being no objection, so ordered.

Mr. **Ireland**. Thank you so much.

[The prepared statement of Mr. Ireland follows:]

Statement of Hon. Andy Ireland

Mr. Chairman, I appreciate this opportunity to appear before your Subcommittee to discuss the proposed 1984 budget cuts in the National Weather Service's Early

Frost Warning Service. As you know, elimination of this program would seriously affect Florida's citrus and winter vegetable industry as well as producers in the States of Texas, Arizona and California.

I only want to make a few brief remarks by way of introduction for my good friend and colleague from Lakeland, Florida, our State's principal citrus marketing organization.

Once again we are faced with elimination of funding for the early frost warning service currently provided in Florida by the Ruskin weather station. This service has been and continues to be a very crucial and necessary management tool for the citrus, vegetable, floral and other agricultural industries. Timely and accurate weather information is extremely important to a citrus grower who is faced with the management decision of whether to initiate a costly freeze protection program for his groves such as flood irrigation, low volume irrigation or the use of grove heaters. Without reliable temperature forecast updates from the Ruskin weather office, inefficient use of available resources result which ultimately impact on the consuming public.

The freeze of January, 1982 is a perfect example. Growers waited as late as possible before commencing costly measures to protect their groves. The weather advisories from Ruskin allowed producers to wait until it was absolutely necessary. This delay allowed growers to conserve enough fuel to get them through the night and protect their crop. This action saved farmers literally hundreds of thousands of dollars in fuel costs and millions in crops that survived the freeze. Approximately 25 percent of the crop was lost, but without the frost warning service it is estimated that as much as 50 percent of the crop might have been destroyed.

In fiscal year 1982 concerned Members of Congress, the Florida citrus industry and other agricultural interests accepted a 50 percent reduction of the staff of the Ruskin Weather Station in return for a continuation of the early frost warning system. It seemed to me at the time that given the magnitude of the industry which the service helps protect that for Florida and the nation this was a cost effective bargain by any standard.

The vast cooperative nature of the reporting sites and the technical expertise needed to tailor weather data for the agricultural industry has developed into a cost effective means for protecting Florida agriculture from the ravages of an unexpected frost. As you know, Mr. Chairman, I am a proponent of turning many federal functions over to the private sector, but it appears, in this instance, that private sector weather services either would not or could not duplicate the existing program in such a cost efficient manner.

Attempts have been made to find adequate private sector weather services to meet this need. For a number of reasons such an approach proves unrealistic: Private services wish only to provide the long term forecasts, not the tailored services now given; they do not have access to the public service vehicles of comminicating the weather information which is available to the National Weather Service nor do they have the capability to utilize the latest weather innovations including satellite technology.

Weather forecasting, at best, is frequently a guess, and frequently inaccurate. Thus, the margin for error would be even greater during the period needed for private sources to build up the expertise and capacity to even approach the service now provided, cost-effectively, by the National Weather Service.

In conclusion, Mr. Chairman, it would be more costly and contrary to our national interest to eliminate this program now in the absence of any viable alternative. I request that this Committee recommend restoration of funding for the early frost warning service to its 1983 level.

Thank you for this opportunity to express my views.

Mr. **IRELAND**. It is my pleasure, Mr. Chairman, to introduce a gentleman from Florida who all of us in the vast citrus industry have great respect for, Mr. Bobby McKown, the executive vice president of Florida Citrus Mutual, an organization that represents the vast majority of citrus growers in Florida, a man who not only has a great degree of experience himself, but those in his organization that he is surrounded by have that kind of experience that I think would make a contribution to our dialog here today.

I bring you, without further ado, Mr. Bobby McKown.

Mr. **SCHEUER**. We are delighted to have you, Mr. McKown. Do you have a prepared statement?

Mr. McKown. Yes, sir, I do.

Mr. Scheuer. That will be printed in full at the appropriate point in the record. You are the last witness of the day, so why don't you just sit there and relax and chat with us for 8 or 10 minutes, and then I am sure that all of us, including your distinguished Congressman, will have some questions for you.

STATEMENT OF BOBBY McKOWN, EXECUTIVE VICE PRESIDENT, FLORIDA CITRUS MUTUAL

Mr. McKown. Yes, sir. Thank you, Mr. Chairman and members of the committee.

Mr. Ireland, I appreciate your coming today and making those kind remarks on my behalf for the citrus growers of Florida, and I thank you, sir.

Mr. Chairman, since my statement will be printed in the record in full, I am just going to basically cover some of the highlights and offer some firsthand impact that the Frost Warning Service has upon the agricultural interests in Florida, and citrus in particular.

Mr. Chairman, in Florida we have 38 food crops that generate more than $5 million in annual sales, so we are a State that is made up of a broad-based agricultural production, just like our fellow State of California. Weather conditions in Florida are very unusual. We don't make the weather in Florida, we receive it, and so it is very important to know how those wind currents and all are going to change and whether or not we are going to be impacted by a severe freeze.

I particularly have reference to 1981 and 1982, and the impact that had upon us and the importance that the Weather Service had for our members. If it had not been for the Frost Warning Service, our losses would have been far greater than the 40 percent we sustained in 1982 and the 30 percent we sustained in 1981. Therefore, the Weather Service is very important to us.

Second of all, early on, when it was first addressed about costcutting in the Weather Service in Florida, we met with the members of our delegation. We met with the Frost Warning Service director and the Ruskin facility staff. We analyzed what their capabilities were and the total number of people they had on their staff, and what their projections could be and the services they could render.

We immediately concluded, then, that we would recommend a 50-percent reduction in the staff and in the funding and we could still have the total benefit of the Frost Warning Service without any deterioration in service. We supported that 50-percent cut, and it has worked fine with us, also using elements of the private weather service in conjunction with that to our best interest.

In Florida we have 32 citrus-producing counties out of the 68 counties. We produce and have growing today 845,000 acres of citrus. We have 90,000 people employed directly in our economy; we have another 87,000 people employed indirectly as a result of citrus in Florida. Citrus is second in the economy, second to tourism, and tourism is tied to weather as well.

Mr. Scheuer. The memory of tourism is tied to those little citrus shops in the airport where you buy your last little package of oranges and grapefruit and bring them back to Washington. You enjoy that wonderful, fresh flavor for a week or two and then you begin thinking about going back there to get some more.

Mr. McKOWN. Yes, sir, and we hope they continue to buy a lot of grapefruit because right now we have plenty of it.

Mr. Chairman, let me just point out one observation to you, a specific instance of how important the Weather Service was to the Florida citrus growers and the winter vegetable crop in Florida this past year.

The Weather Service advised us early on that we could expect a hard freeze coming into Florida on Tuesday. This was on Saturday. They called me at home, the weather forecaster. We talked, and then my staff member continued to contact him over the remainder of the weekend. The Weather Service, all the private radio stations and the television stations are in some form of reporting, but they still depend on the Government, as people previously testified today. They take those data, assimilate that, and then disseminate that to their customers and to their viewers.

They were saying that the hard freeze was going to come, and the adverse impact it could have upon agriculture. We continued to stay in contact with the Frost Warning Service. They told us on Monday that they didn't believe that it was going to occur. Then this was disseminated throughout the citrus belt, disseminated to growers.

We continued to monitor that through Tuesday, and at 4 o'clock in the afternoon they said, "We are not going to have the hard freeze we were thinking we were going to have." What happened? Then at 10 o'clock the final report was issued, that we would have freezing conditions about daylight.

Therefore, what did it do? We have 10 percent of the acreage in Florida that can be fired with the grove heaters you see on TV. Now if we had not had this information of the Frost Warning Service available to us, to look at the narrative and the full detail of their report, then it costs $230 per acre to fire those groves per night. That would mean 80,000 acres would have been fired that night at a cost to the Florida grower, and on to the consumer, of $18,400,000.

Now we didn't use that fuel and we kept that resource from being burned up that night. That is $18,400,000, and the current budget this past year was $209,000, as you know, the line item for the Frost Warning Service. Therefore, we believe that this is a tremendous return on an investment. We believe that the Frost Warning Service is one of the most efficient cost-benefit ratio agencies of Government, that performs a tremendous service for American agriculture and Florida citrus in particular.

Mr. Chairman, we also contacted the private sector weather services some time ago and reviewed with them what the details would be. First of all, they are not really interested in giving us the detailed information that we need and must use as growers. What they want to do is give us a 1-day, 1-week, 1-month, 90-day forecast, and then general information from time to time. Therefore, that cost was going to be for a 2-month forecast only, to our association, $35,000 to $45,000.

That is one cost factor, but secondly, how would we disseminate that to our 13,341 members? It becomes almost impossible to do that under the current mechanism. The Weather Service has the credibility; all the weather stations, the radio and television, the news media, and everything in Florida looks upon them as an unbiased source.

We also have concern about the private sector being utilized because of the futures market for trading of orange juice. You know the futures markets are very volatile. Rumor makes the futures market move up and down. I don't totally understand it but I understand rumor, and I understand when it has an impact on the market conditions. We believe that the Frost Warning Service must be an unbiased mechanism that can deliver the data we have so we know it is reliable.

Mr. Chairman, I will comment in one other area. The users of agricultural weather forecasts fall into two general groups. First you have the agricultural producer, the farmer, the rancher, the grower. He uses this for daily operations. In Florida the weather forecasts are becoming more important daily because 2 years ago we were in a drought; we didn't have enough water. This time, today, we have more water than we know what to do with.

Irrigation is energy; energy is money, energy is cost. We must move the water off the groves, onto the groves, in irrigation, on almost a year-round basis in Florida, so it is very important that we know if we are going to have precipitation or what type weather conditions we are going to have, because to put 1 inch of water onto a grove takes a considerable number of Btu's of energy to run those engines and everything, so it is very important.

Mr. SCHEUER. You are talking about 1 acre-inch.

Mr. McKOWN. Yes, sir, 1 acre-inch. Yes, sir. It is very important. We use the irrigation system, as well, for cold protection in the wintertime. As you know, diesel fuel is $1 a gallon. When diesel fuel was 9 cents a gallon, you made a different economic decision than you do when it is $1 a gallon, so we are not going to use any energy resource unless it is absolutely necessary. Therefore, we need the best data available.

In addition to that, now, we are working with——

Mr. SCHEUER. You need it in a very timely fashion.

Mr. McKOWN. Yes, sir.

Mr. SCHEUER. Almost within hours of the fact——

Mr. McKOWN. Exactly.

Mr. SCHEUER [continuing]. So that you can fine tune your use of what is becoming a very expensive and valuable and scarce fuel.

Mr. McKOWN. Yes, sir, exactly. In fact, that is one of the key elements that the Weather Service, the Frost Warning Service, makes available to American agriculture, particularly today, because you do have updated information from the general forecast and then you have updates as you move into that cool period during the night, and there is frost protection, as well as hurricane or drought or precipitation or excessive rainfall or whatever. It goes to that overall management expertise, that our Government through our Extension Service now are attempting to give the best economic delivery system in American agriculture for Florida citrus.

In addition, in Florida we are now working with the University of Florida in the IFAS extension program, whereby through our counties we will tie in the Frost Warning Service in Ruskin into those counties, in each citrus-producing county, to provide computerized information more readily available to the growers. Communication of weather is the greatest device we must have, the timeliness of dissemination of that information. We could have all the weather data available, but then we must be able to communicate that.

We believe that the Weather Service now, as we know it, has the credibility. They do an excellent job and they perform a tremendous service, and the return on investment to Florida growers is outstanding.

We call upon you and the members of your committee to continue the funding of this program, because we believe it would not only be in the best interest of growers, but the U.S. consumers and the people of these United States.

I thank you, Mr. Chairman.

[The prepared statement of Mr. McKown follows:]

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BOBBY F. McKOWN
EXECUTIVE VICE PRESIDENT

Statement of

Bobby F. McKown
Executive Vice President and General Manager
Florida Citrus Mutual

Subcommittee on Natural Resources,
Agriculture Research, and Environment

Committee on Science and Technology
U. S. House of Representatives
Room 2318, Rayburn Office Building
Washington, D. C.

March 9, 1983

Good morning, Mr. Chairman and members of the Subcommittee.

My name is Bobby F. McKown. I am Executive Vice President and General Manager of Florida Citrus Mutual, a voluntary cooperative trade association whose membership consists of more than 13,341 active Florida citrus growers, with headquarters at Lakeland, Florida.

Florida's citrus and winter vegetable growers have, do and must continue to depend upon timely information from the fruit frost warning service of the vital U.S. Weather Bureau at Ruskin, Florida. We believe that the Ruskin facility has the latest equipment and state-of-the-art capabilities to more effectively utilize the space age weather technology than any other agency or parts of the private sector. Weather forecasting at its best continues to fall short of the desired mark; however, NOAA provides the most cost efficient agricultural weather forecasting delivery system for Florida growers. In fact, we are just now beginning to adopt the satellite technology into better agricultural frost warning weather forecasting. If the Ruskin facility is scrapped, then these technological advances will be stymied and, in our opinion, would severely handicap our growers' productivity.

An agricultural operational weather advisory should seek to provide growers with interpreted weather information that can enable them to make better grove protection-related decisions and thereby increase profits by reducing losses, increasing yields and reducing production costs. It should be viewed as an additional management tool.

The Florida citrus industry consists of predominantly small growers (less than 50 acres on the average) with total acreage of 845,283 located in 32 counties. Small growers cannot afford a private weather service. The $209,000 budget for minimum temperature and frost warning weather system is cost effective, particularly in the area of energy conservation. Low volume irrigation systems are utilized for frost and freeze protection by citrus growers, particularly when temperatures forecast indicate sustained temperatures below 28° - 26°F for six or more hours. Also, growers of specialty citrus fruit utilize grove heaters for fruit protection. Fuel and labor costs to fire a grove range up to $230.00 per acre/per night. Therefore, timely Ruskin weather forecast updates are economically mandatory in order to conserve fuel, prevent unnecessary firing and determination of proper time for commencing the firing operation.

Small growers also use flood irrigation methods for cold protection; again, energy is an important cost in their management decisions. Without the federal frost warning service for citrus, then, our growers cannot take changes. So they fire, flood, irrigate, etc. without efficiencies. Costs rise, consumers and growers, packers and processors are adversely economically impacted, and all adds to the inflationary spiral. The $209,000 budget line item is a good and proper use of growers' federal tax dollars. Our industry is not subsidized, nor do we seek price supports, etc.

Florida Citrus Mutual's staff has met with private sector weather services, which desire to give long-range, weekly forecasts with some direct, limited, short term telephone communications. They do not contemplate service approaching the magnitude or precision of the frost warning service; yet the quoted fees to our association for a two months service (January - February) would be $35,000 - $45,000 for this limited inadequate service.

We have conferred with public broadcasting facilities. They are not interested in providing frequent, regularly scheduled weather forecasts or narratives and they are unwilling to read the forecast in its entirety. It is important that the forecast be received without change or editing by our grower members; because the National Weather Service staff develops narratives explaining the basis for the forecast which are unavailable from other sources.

Public and private organizations are not equipped to handle the demand for weather information.

If we could afford it - and we can't - how could we communicate these data from our collective association to our 13,341 members statewide in a timely manner that would be useful? We can't. The National Weather Service via Ruskin has and can communicate these reports via radio, TV, teletype, etc.

Mr. Chairman and members of this subcommittee, Florida Citrus Mutual supports efficiency and good management practices within all agency/governmental channels. However, we respectfully request that the Congress continue to fund the minimum temperature and frost warning forecasts and provide the agency with a priority management directive in order for the agricultural frost warning weather forecast to continue.

Florida Citrus Mutual has already supported a 50 percent reduction of the number of professional personnel at Ruskin from eight to four meteorologists; furthermore, four staff meteorologists would permit continuing the minimum temperature and frost warning forecasts seven days a week, two shifts per day in lieu of full-time 24-hour service. Minimum temperature and frost warning services are important in pre-freeze preparation and vital in post-freeze evaluation of damage to determine juice loss, fruit loss, etc. To eliminate this vital service would deal a severe blow to an industry that is a linchpin of Florida's economy, and set in motion waves crashing against other indirectly affected industries and services.

The Florida citrus industry is a \$2½ billion industry; it keeps 90,000 people gainfully employed; it is our state's second largest single industry; and provides stability to our state's economy. For each citrus dollar generated, our multiplier effect is \$2.85.

Florida Citrus Mutual does not believe the frost forecast service to be a direct support program for a single industry; it benefits all U.S. citizens. The economic well-being of the agricultural industries of Florida is of direct and major importance to hundreds of thousands of employees not only in the fruit and vegetable industries, but also to those whose livelihood depends upon the serving of these industries.

During 1981 and 1982 the Florida agricultural industry suffered back-to-back devastating freezes and certainly damage would have been far more extensive had we not had the Ruskin Weather Bureau in operation.

Users of agricultural weather forecasts fall into two general groups. The first is the agricultural producer; the farmer, rancher or grower who uses forecasts for daily farm operations and planning. The second group includes the interpreters who combine weather and agricultural information to formulate advisories for use by agricultural producers and agricultural industries which are weather sensitive. The Federal Frost Warning Service provides these vital data to our grower members.

In summary, the Ruskin station personnel are of vital importance to protection of the multi-billion dollar investment Florida growers have in more than 845,000 acres of citrus groves, not to mention the major property values invested in Florida's unique tropical fruit and foliage industries. Florida Citrus Mutual recognizes and appreciates the need to economize in government, but we also continue to believe that after additional evaluation, total abolition of the important fruit frost warning service would be adverse to a major segment of Florida's economy. We respectfully request that you support the continuation of the frost warning service and adequate funding to provide this important service.

If you have any questions, I would be happy to respond.

Thank you.

Respectfully submitted,

Bobby F. McKown
Executive Vice President

Mck:vb

Mr. **Scheuer.** Thank you very much for your very excellent testimony, Mr. McKown. We appreciate it. It was very thoughtful and very provocative.

I yield to my colleague from Florida, if he has any questions.

Mr. **Ireland.** Thank you, Mr. Chairman.

In addition to being altruistic, I want you to know, Mr. Chairman, the last time he was introduced he was roasting me, and I want to call to your attention how much nicer I have been to him.

Mr. **Scheuer.** I hope he didn't waste a lot of that precious fuel he has been describing.

Mr. **Ireland.** Absolutely not.

Let me just say, again, I appreciate as you do, Mr. Chairman, the fact that Mr. McKown would come here and speak for one of the Nation's most essential agricultural industries. I would like to emphasize a point the gentleman has made concerning the futures market. I think this bears emphasis because in past testimony and in the record it is often ignored, and that is the very point that you make, that if this isn't a public service and if it isn't instantaneously available to all, you have that age-old opportunity for those in the know to profit at the expense of those that are not. Having seen our industry work, having served it in the banking business, I can only emphasize that you are right on target, and that if this is not a public service, we are going to have some real difficulty in the futures market for sure.

Again, I thank you for being here.

Mr. Chairman, thank you.

Mr. **Scheuer.** Thank you very much, Congressman Ireland. We appreciate your intervention and your appearance before this committee, and we appreciate your expertise in this problem.

Mr. McKown, I am going to subject you to a little surprise. I am going to ask Dr. George S. Benton to rejoin the witness table.

Now Dr. Benton described to us just a few minutes ago how our Weather Service was operating on the basis of a model T Ford rather than a 1983 model—I'm not going to mention what model, because it might turn out to be a Mercedes-Benz or a Toyota. However, let's assume it is an American model.

Dr. Benton, can you tell us how you could advantage Mr. McKown and his colleagues if, instead of having the model T service technology available to them, they had what you would call the ultimate state-of-the-art technology available to them this year? How would that improve the reporting? How would that improve the accuracy? How would that improve the timeliness, let us say, of this frost warning information that they have been getting? How would they be benefiting from the state-of-the-art application of communications and forecasting to the service they are getting now?

Dr. **Benton.** Mr. Chairman, that is a very interesting question. I must say that although I feel that I know the various parts of the Weather Service and NOAA quite well, I have never had the opportunity to particularly study the citrus Frost Warning Service. I know about it by reputation but I haven't looked at it personally. Therefore, I am a little at a disadvantage because I don't know enough about the present operation. However, let me describe the kind of operation that is perfectly possible, and I will leave it to Mr McKown to contrast that with the existing service.

Mr. SCHEUER. Good.

Dr. BENTON. First of all, satellites are extremely important. Satellites can measure surface temperatures directly from space with a very high degree of accuracy, and they can measure the temperatures quite accurately in their geographic distribution. This information, plotted over time and watched over time, permits one to view how the boundary of frost is moving towards the South, how it is developing over the night as as result of the dropping in temperatures.

Satellites are also particularly useful in looking for clouds, and of course when you have clouds moving in it tends to inhibit the outgoing radiation and prevent the very low temperatures from being achieved. Therefore, adequate use of satellites and tying these into the operational system of the Weather Service and the communication systems of the Weather Service is the basic problem here.

I think, from what my impression is, that this could be definitely improved, but I also have the impression from what I know of it that the Fruit Frost Service is an excellent service. It is not the part of the Weather Service that I would say is in the greatest and direst need of improvement; certainly improvement is possible but better communications and better use of satellite information to me would be the key for improved forecasts.

I would appreciate your comments.

Mr. MCKOWN. Yes, sir. We are beginning to use more and more the satellite technology. However, for instance, just of late much of those data have been curtailed because of the reduction in dollar resources to Ruskin. That technology is available but they don't have the funds and the mechanism to implement it, so it is on the shelf and it is not being utilized to the fullest degree.

Dr. BENTON. This gets back to the point, Mr. Chairman, that it isn't just the observations. It is getting those observations into the forecast system, analyzing them effectively, and getting them out to the user quickly and promptly, and that we can do a much better job of than we are doing at the moment.

Mr. SCHEUER. Congressman Brown?

Mr. BROWN. Mr. Chairman, I have been very interested in this testimony because, as Mr. McKown knows, California raises a few citrus fruits also. I thought he might say something that I might have to rebut from the standpoint of California citrus. [Laughter.]

However, his testimony actually conforms exactly to the reports that I have received from California. They are equally disturbed about the situation, and I would like to merely have the record reflect that his testimony would be concurred in completely by any similar witness from the California citrus industry. I am very grateful to him for making the statements that he has, and I want to thank him for that testimony.

I am interested in exploring a little further this matter that you raise of how we can improve the operations of the system. Certainly for the huge cost benefit we are getting from the existing system, I would just like to indicate that it would be penny-wise and pound-foolish to do anything to disrupt that system, and the testimony of both these gentlemen has in my opinion added a great deal of support to continuing with the operation.

Mr. **Scheuer**. Dr. Benton, let me ask you this: You have indicated and Mr. McKown has indicated that the Frost Warning System actually is in fairly decent shape now. Can you think of any other weather forecast system for other clients—for ships, for any other user—how that other service, perhaps, could be significantly improved by the application of top-of-the-art satellite services, forecasting, communications, the whole works?

Dr. **Benton**. Without any question, I think there could be marked improvement throughout the entire service. I would like to say, to again emphasize, that it is not just observation. It is collection, analysis, communication, and I must say that I listened to the testimony of Mr. Harrison very warmly because I understand full well the kinds of pressures that the forecasters—who are in the trenches, as he said—are under at the present time.

The management of the Weather Service is receiving insufficient funds and is torn between the problem of whether it should plow these funds back to strengthen the conventional services or whether it should try to improve the services using some of the modern technology. The one thing it simply cannot afford to do is to take money away from the existing services in order to fund new techniques, because the existing services are already at the breaking point and new resources need to be used if we are going to improve the system.

Mr. **Scheuer**. Now I am asking you to do a little brainstorming. If you had additional funds available for improving the system, what kind of benefits could be accrued? Who would be benefited and how? Would those benefits, those benefits to American producers, American consumers, would those benefits be equal to or perhaps substantially in excess of the cost of producing those benefits?

Dr. **Benton**. I think the answer to that is yes, they would be. I would like to refer you again to our call to action document. In this we identified the cost as being in the range of $100 million a year of new resources over a period of 10 years, but let's work with the annual amount, $100 million. For this, we believe that we can as a minimum reduce damages by $1 billion a year——

Mr. **Scheuer**. That is 5 percent of the $20 billion——

Dr. **Benton**. Five percent of the average $20 billion. This does not take into account improved efficiency. If a farmer decides, for example, not to irrigate because he gets a forecast of a storm coming along, this does not go down as a saving against damage but it is an improvement in efficiency. In this book you will find many examples from industry and agriculture about how efficiency can be improved. Efficiency improvement means a sounder economy and, in the long run, it means more taxes for the Government.

The third type of savings——

Mr. **Scheuer**. Excuse me. Aren't there also some public interest benefits to the United States——

Dr. **Benton**. Absolutely.

Mr. **Scheuer** [continuing]. Apart from the financial benefits? If we can save on the consumption of fuel—what we have learned the hard way is a very precious and very valuable asset—if we can save in the consumption of fuel, wouldn't that saving in fuel consumption make us perhaps less dependent on Persian Gulf oil? Wouldn't that make us more energy-independent in this country?

Dr. BENTON. Yes, sir. I think that an effective weather service would have a substantial impact in improving our planning and use of natural resources generally, including not only energy, as you say, but also water resources, for example, and others. It would be quite useful in this regard.

Mr. MCKOWN. Mr. Chairman, I think particularly in the Florida citrus industry it would do a number of things. First of all, as we utilize these data of the frost warning service, we reduce our losses. Thereby we reduce our need for fuel which is imported. It also gives us more product available for shipping into the export market, which further helps our balance of payments and our trade deficit. It reduces the amount of fuel we purchase; it increases our exports. Thereby, we are attacking the deficit in the balance of payments on two fronts. Agriculture, as you know, is making a significant contribution in that balance of trade. We are doing that because of being efficient.

This is one of those tools that enables us to be more efficient and not expend a resource when we don't have to. Without it, then we would not take the chance of losing our crops and we would go ahead, and have to be wasteful and inefficient, and you can't compete today.

Dr. BENTON. May I add one item of the value of this service which I think is often overlooked, but I think Congress will be very sensitive to? That is the sense of service to the public. We have heard very often about the need for getting the Government off the public's back. As was stated earlier today, that doesn't seem to apply to the weather business because they don't want nature on their back instead.

Our committee made a very simple little computation. We all make decisions about the weather, personal decisions. They could be simple decisions such as, should you take the afternoon off to go sailing, which isn't a world-shaking venture but it isn't very nice to take the afternoon off and then find the weather is terrible; or decisions that are more meaningful, such as decisions as to whether you should stay home or whether you should make a business trip where you have to drive, because of road hazard.

These kinds of decisions the public makes every day. There are over 1 billion calls each year made to the automatic weather numbers around the country that give weather to our citizens, 1 billion. If you value these at 10 cents apiece, that amounts to $100 million a year.

Let me give you another example. The NOAA weather radios are largely dedicated little units which sell for anywhere from $15 to $75, which are tuned directly into NOAA weather radio. They are not good for getting anything but the weather broadcasts. The National Academy of Sciences, in its report a few years ago, pointed out that $100 million a year is spent by the public to get radios that do nothing but tune in the weather forecast.

Our committee made a simple little back-of-the-envelope computation, which sounds so simple that one doesn't trust it, but let me do it anyhow: If every citizen in this country on the average makes one weather-related decision this week, and if that decision is only worth 25 cents to him, the total value of all these decisions in this country will be $2.8 billion a year, and the public has this interest.

Now if we can improve our weather services markedly—and we can—by spending $100 million more a year, I think we should do it. It is not only industry, it is not only agriculture, it is not only national defense, it is not only the effectiveness of government, it is also the ability of the public to get information it wants and believes it needs.

Mr. **Scheuer**. Well, I thank you both.

Mr. **McKown**. Mr. Chairman, may I make one point and follow up on a point that you made? I subscribe, at our association, to a private weather service, but we also totally depend upon the frost warning service. Just to give you an example of why communication and timeliness is so important, the private weather service advised me—and we provided our members with this—that on January 13, 1981, when we had the freeze in Florida that reached 13° for 8 hours or more, they advised me that we would expect 45° weather that day and that evening.

Therefore, what I am saying is, that private sector service was doing the best it could in the long range, but you need that up-to-the-moment, continuous frost warning service that we believe only the Ruskin facility can give.

Thank you, Mr. Chairman.

Mr. **Scheuer**. Do you have any questions?

Mr. **Lewis**. Mr. Chairman, I have several questions but I will ask them to submit them in writing.

Mr. **Scheuer**. OK.

Well, this has been extraordinarily interesting and really exciting testimony, and I thank you both for it.

I have only one further question to ask before adjournment, and that is, is anybody out there in the administration listening?

[Whereupon, at 4:45 p.m., the subcommittee adjourned.]

APPENDIX I

ADDITIONAL STATEMENTS SUBMITTED FOR THE RECORD

STATEMENT OF

WILLIAM MATUSZESKI
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

before the

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

COMMITTEE ON SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

March 2, 1983

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to testify on the reauthorizations of Title II of the Marine Protection, Research and Sanctuaries Act, and the National Ocean Pollution Planning Act.

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT

I would like to summarize the results of National Oceanic and Atmospheric Administration's (NOAA's) monitoring and research efforts in fiscal years 1982 and 1983 under Title II of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (P.L. 92-532). Section 201 of Title II assigns responsibility to the Department of Commerce for continued monitoring and research on the effects of dumping material into ocean waters, coastal waters and the Great Lakes. Section 202 of Title II directs the Secretary of Commerce, in consultation with other agencies, to initiate a comprehensive program of research on long-range effects of pollution, overfishing and anthropogenic changes in ocean ecosystems.

The programs conducted under Section 201 and Section 202 of MPRSA are augmented by financial assistance authorized under section 6 of the National Ocean Pollution Planning Act (P.L. 95-273). In 1982 and 1983, NOAA has combined these three formerly separate programs, into a single coordinated effort, pursuant to Section 5, P.L. 95-273. I will discuss this program as a unit and document the allocation of funds within the program.

The goal of this NOAA program is to provide information on marine pollution, including waste disposal, in order to aid policymakers in Congress, other Federal agencies, state and local governments, industry and the public.

Specifically, the NOAA program seeks to

- determine the ways in which ocean disposal affects marine ecosystems,
- assess the risks to human health posed by ocean dumping,
- improve our understanding of the inputs, distribution, transfer and overall balance of materials released in the oceans,
- evaluate the environmental effects of past and present dumping by studying specific dumpsites and relating the knowledge gained there to broader regional and national problems,

- investigate the basic natural processes controlling the distribution and effects of pollutants,
- develop monitoring procedures to measure the effects of continuing, stopping, increasing or decreasing waste disposal at specific sites,
- monitor different types of wastes dumped at specific sites to determine the degree of risk associated with each type and to determine the capacity of each site to assimilate those wastes, and
- study possible alternative marine-disposal procedures and techniques to determine the environmental and human health risks of each, and to predict the consequences of waste disposal over time.

The NOAA Program accomplishes these goals by managing and sponsoring research performed by scientists and engineers from NOAA laboratories, other Federal agencies, state and local governments, industry and academic and research institutions.

For FY 1983 the program focuses on (1) contaminant distribution and biological response in selected coastal regions: in the heavily used New York Bight, at a recently abandoned sewage sludge dumpsite off the Mid-Atlantic Coast, and at deep ocean dumpsites; and (2) comparative studies of dispersion from coastal outfalls versus barge dumping in Puerto Rico (pharmaceutical wastes) and off Orange County, California (sewage sludge).

NOAA is examining the dispersion and biological effects of these waste materials in the ocean.

FY 1984 Program

The budget request for these assessment and research programs in FY 1984 is $6.4 million.

We are currently reviewing our marine pollution programs to determine how information required for marine pollution management decisions can be developed in a more cost-effective manner. We plan to reduce research on the effects of marine pollution that is not directly related to management decisionmaking. We will reduce site-specific research that is not needed for near-term Federal decisionmaking. Since we have already carried out considerable research on ocean dumping, we will continue to emphasize the synthesis of this knowledge to help guide the decision process. We plan to increase our focus on national problems since we anticipate that all coastal areas of the U.S., rather than just the Northeast, will propose the use of the ocean for waste disposal. NOAA will continue its efforts to assess long-term trends in marine environmental quality, particularly in those areas which are already highly stressed.

In order to continue these important efforts, we request that Title II of the Marine Protection, Research and Sanctuaries Act be reauthorized at a level of $4.835 million for FY 1984 and such sums as necessary for FY 1985.

National Ocean Pollution Planning Act

As you are aware, ocean pollution research, development and monitoring programs by the Federal government are extensive. The National Marine Pollution Program Office estimates Federal expenditures of $138M for FY 1981, $125M for FY 1982, and $117M for FY 1983. These programs are conducted or supported by eleven Federal departments and agencies. The Congress enacted the National Ocean Pollution Planning Act, P.L. 95-273, and subsequent amendments, P.L. 96-17 and P.L. 96-255, based on the need to develop a comprehensive plan to improve the coordination of these programs. The Administration recommends that this statute be reauthorized through fiscal year 1985 at the level necessary to complete the purposes of the Act.

The National Ocean Pollution Planning Act directs NOAA to undertake the following activities to develop a concerted Federal ocean pollution research effort.

-- Section 4 requires the preparation of a comprehensive five-year plan to guide the overall Federal effort in ocean pollution research, development and monitoring. The plan is to contain an assessment and ordering of national needs and problems, a list of related federal programs together with an analysis of each program's contribution to the priorities established by the plan, and policy recommendations to guide Federal research. The original requirement that the plan be revised every two years was recently changed to every three years by the 1982 Congressional Reports Elimination Act (P.L. 97-275).

-- Section 5 requires NOAA to establish a comprehensive ocean pollution research, development and monitoring program consistent with the priorities established by the plan and to include projects for which NOAA has responsibility pursuant to Title II of the Marine Protection, Research, and Sanctuaries Act.

-- Section 6 stipulates that a financial assistance program for research, development and monitoring programs be established to meet research priorities not adequately addressed by Federal programs.

-- Section 8 assigns NOAA the responsibility to disseminate findings and information generated by these programs to federal agencies and to the general public.

Within NOAA, sections of the National Ocean Pollution Planning Act are implemented by various program offices. NOAA has established the National Marine Pollution Program Office within the National Ocean Service. This office prepares and coordinates the five-year plan required by Section 4. Responsibility to develop and support comprehensive ocean pollution research, development and monitoring programs specified in Sections 5 and 6 has been assigned to the Ocean Assessments Division of the National Ocean Service's Office of Oceanography and Marine Services. This Division is also responsible for implementing Title II of the Marine Protection, Research and Sanctuaries Act. As a result of NOAA's internal reorganization during the past year, the National Marine Pollution Program Office and the Ocean Assessments Division have both become components of the new National Ocean Service. This change will result in improved coordination in implementing Sections, 4, 5, and 6 of the statute. The information dissemination program required by Section 8 is administered by the National Oceanographic Data Center of NOAA's National Environmental Satellite, Data and Information Service. The Center serves as a program office for NOAA's comprehensive data and information service.

I would now like to describe specific accomplishments under each of these sections and list activities to be undertaken during the reauthorization period. As required by Section 4 of the National Ocean Pollution Planning Act, the first Federal Plan for Ocean Pollution Research, Development, and Monitoring was published in 1979. A revised and expanded version of the plan was published in 1981 and the third plan is due to Congress in September of 1985. Plan appendices have been published which detail the accomplishments of federal ocean pollution research programs and describe approximately 1000 projects conducted across the Federal government.

Planning and implementation efforts include senior representatives of eleven Federal departments and agencies conducting and supporting research, the Office of Management and Budget, and the Executive Office of Science and Technology Policy. An interagency Committee has been chartered under the Office of the President's Science Adviser to guide the planning effort. The Interagency Committee on Ocean Pollution Research, Development and Monitoring (COPRDM) is chaired by NOAA's Deputy Administrator and operates under the Federal Coordinating Council for Science, Engineering and Technology. An interagency task force representing each of the Federal departments and agencies actively works with the National Marine Pollution Program Office to develop the plan and coordinate implementation.

A number of efforts are now underway to implement the recommendations presented in the Second National Marine Pollution Program Plan. These efforts focus on priorities for action identified in OCS environmental studies, waste disposal research, marine pollution implications of increased coal use and general program support.

General Program Support

Quality assurance is identified in the Second Federal Plan as a major concern in the realm of general program support. NMPPO is now trying to improve coordination of quality assurance in measuring chemical constituents in the environment. A working group has been set up with representation from eight Federal agencies that support pollution research and the National Bureau of Standards to prepare a multi-agency overview of existing quality assurance measures. If a need is demonstrated, future efforts supported by the Interagency Committee may include quality assurance seminars and interlaboratory calibrations using reference samples from the National Bureau of Standards.

The Third Federal Plan, which is due to Congress in September 1985, will include recommendations generated by the efforts described above. It will also include the results of detailed analyses of such timely issues as ocean disposal of radioactive wastes.

Section 5 of the Act directs NOAA to establish a comprehensive ocean pollution research, development and monitoring program. In developing the program, NOAA considers resources and activities associated with:

-- The Ocean Pollution Planning Act itself, specifically those activities involving financial assistance for research addressing priority needs in marine pollution and for dissemination of information;

- Title II of the Marine Protection, Research, and Sanctuaries Act of 1972, including ocean dumping investigations and research into the long range effects of marine pollution, together with related regional marine ecosystem investigations and research into the effects of accidental discharge; and
- Research activities associated with other NOAA programs, including habitat investigations, research into microconstituents in fishery products, Great Lakes research, Sea Grant, OTEC and deep seabed mining.

The goal is to develop a national perspective on marine pollution in order to guide policy decisions, provide leadership to a national research program, develop an understanding of pollution impacts, provide scientific support for spill response, and evaluate pollution status and trends. The NOAA program is conducted in accordance with the National Marine Pollution Program Plan.

To fulfill the requirements of Section 8, a comprehensive information-dissemination system is being developed by NOAA's National Oceanographic Data Center. This system will establish a network of coordination and referral areas with a central office in Washington and will be fully operational by 1985.

The Ocean Pollution Data Information Network (OPDIN) will improve the acquisition and facilitate timely dissemination of marine pollution data among Federal agencies, as well as to state and local governments and the private sector.

I would now refer to the report to the Secretary of Commerce, "Need to Strengthen Coordination of Ocean Pollution Research," issued by the General Accounting Office in July, 1982. The report indicates that NOAA has made considerable progress toward implementing the National Ocean Pollution Planning Act, and refers specifically to the publication of the first Federal Plan and the accompanying program summaries of eleven agencies conducting or supporting research. The report also acknowledges the contributions made by NOAA in conducting a comprehensive review of oil pollution and improving communication between researchers and Federal pollution program managers.

The report, however, makes two recommendations. The first is that legislation be sought to provide NOAA greater authority to review ocean pollution research budgets of Federal agencies in an effort to improve fund coordination. The second is that future plans provide more detail regarding the allocation of Federal funding to priority research areas together with specific agency responsibilities for implementation. Rather than a legislative amendment, the Department of Commerce supports a process of informal budget coordination among OMB, COPRDM and the agencies. The Department of Commerce agrees that the allocation of research funds and agency responsibilities should be more specific in future plans, but recommends that the allocation function continue to be conducted by the Interagency Committee for Ocean Pollution Research, Development and Monitoring rather than by NOAA independently.

In closing, I can assure you of our intent to continue to fulfill the congressional mandate for the National Ocean Pollution Planning Act and to pursue recommendations in the GAO report. We hope to continue to improve coordination in the area of marine pollution research, and intend to focus on developing national plans for research to address the nation's most pressing marine pollution problems. We request that NOPPA be reauthorized at a level of $3 million for fiscal years 1984 and 1985.

Mr. Chairman, this concludes my formal testimony. I will be glad to answer any questions that you or the Members may have.

Comments of

National Marine Pollution Program Office

National Oceanic and Atmospheric Administration

Department of Commerce

Final GAO Report

entitled

"Need to Strengthen Coordination of
Ocean Pollution Research"

B-203956

dated

July 14, 1982

Department of Commerce comments pertinent to General Accounting Office Final Report, GAO/CED 82-108 dated July 14, 1982, on the Need to Strengthen Coordination of Ocean Pollution Research (B-203956)

COMMENTS ON RECOMMENDATIONS TO THE SECRETARY OF COMMERCE

GAO Recommendation

"We recommend that the Secretary of Commerce seek legislation amending the National Ocean Pollution Planning Act of 1978 to more fully realize the congressional purpose of effective coordination of ocean pollution research. The proposed legislation should be drafted after mechanisms or institutional arrangements used in other multiagency coordination programs have been reviewed for their applicability to the coordination of ocean pollution research. At a minimum the National Ocean Pollution Planning Act should be amended to give NOAA or an appropriate interagency coordinating committee, explicit authority to review Federal agency reseearch budgets before they are approved by OMB."

Comments

The Department of Commerce does not support a move to gain interagency budget control for NOAA or the Interagency Committee for Ocean Pollution Research, Development, and Monitoring (COPRDM) through legislation. The GAO comparisons of COPRDM efforts to coordination of research on acid rain and climate are not entirely appropriate. The situation in the ocean pollution area is much more complex than in either of the areas sited by GAO. The scope of the National Marine Pollution Program Plan encompasses 100 individual programs (over 1000 projects) supported by eleven departments and individual agencies. There are at least 16 major pollution issues addressed by COPRDM agencies, any one of which is as complex as the acid rain issue. In addition, each department and agency has specific legislative mandates, and only some of these relate directly to pollution research. Competition for funds occurs within an agency among its own mandates, not across agencies among ocean pollution research needs. The implementation of the GAO recommendation would substantially disrupt the budget process traditionally followed by agencies which has in the past successfully addressed agency mandates.

As an alternative to the approach recommended by GAO, the Department supports a process of informal budget coordination among OMB, COPRDM, and involved agencies. The possibility of performing informal budget coordination in selected program areas has been discussed with representatives from OMB.

GAO Recommendation

"Also, we recommend that the Secretary direct the NOAA Administrator to prepare future ocean pollution research plan revisions so that they address, in more detail than has been the case in the past, (1) how Federal research money should be allocated so that the most important research gets done and limited research money is not diverted to less important programs and (2) how responsibilities should be allocated to agencies exploring similar ocean pollution issues to avoid duplication or inefficiently organized research."

Comments

The Department of Commerce agrees, in principle, with this recommendation. However, NOAA independently should not direct the resources and activities of another Federal agency. The allocation of money and responsibilities to an agency from ocean pollution research can only be accomplished through the cooperation and support of that agency. The Department remains committed to the Interagency Committee on Ocean Pollution Research, Development, and Monitoring (COPRDM) as the most appropriate way to encourage such cooperation and support. The COPRDM planning process involves the sorting out of agency responsibilities to avoid overlap or duplication and to facilitate the development of coordinated efforts. While this process can be improved, significant progress has been made. Initiatives identified in the second ocean pollution research plan specifically allocate research responsibilities to COPRDM agencies based on agency missions. In addition, as a result of the second plan, working groups are being established to define in more detail allocations of responsibilities among agencies. To the extent possible, these more detailed assignments will be reflected in future plans.

FEDERAL MARINE POLLUTION PROGRAMS

FUNDING SUMMARY

April 27, 1983

The attached table summarizes the FY 1981 through FY 1984 budget levels for ocean pollution research, development, and monitoring programs supported by the Federal government. Best information available at this time is presented on actual expenditures for FY 1981, FY 1982, and FY 1983; the figures listed for FY 1984 represent the estimated funding level that will be available under the presidential budget proposed for FY 1984. Information on the specific activities undertaken and problems addressed by individual programs may be obtained by contacting agencies directly or through the National Marine Pollution Program Office (443-8823).

PROGRAM FUNDING SUMMARY
OCEAN POLLUTION RESEARCH
April 27, 1983

	Budget in Thousands			
	FY 81 (Estimated)	FY 82 (Estimated)	FY 83 (Estimated)	FY 84 (Presidential)
DEPARTMENT OF AGRICULTURE				
Effects of Agricultural Practices	196	196	196	196
DEPARTMENT OF COMMERCE				
National Bureau of Standards				
Center for Analytical Chemistry[a]	0	0	0	0
National Oceanic & Atmospheric Administration[b]				
Ocean Dumping	2,470	2,481	2,516	0
Long-Range Effects Research	4,835	4,811	4,871	4,871
Hudson-Raritan Estuary/N.Y. Bight Project	1,450	1,210	1,232	0
Puget Sound Project	1,301	1,106	1,000	0
ERL Great Lakes Pollution Studies	2,364	2,478	2,478	0
Chesapeake Bay Program	0	0	250	0
Habitat Investigations	3,865	3,865	4,115	976
Measurement Systems Development & Engineering Services	600	560	241	0
Ocean Pollution Monitoring (NEMP)	750	752	757	0
Microconstituents	181	181	181	90
Hazardous Materials Spill Response Project	950	932	945	945
Ocean Thermal Energy Conversion (OTEC)	60	208	200	0
Deep Seabed Mining Environmental Research	250	450	535	435
Ocean Resources Coordination and Assessment	400	600	600	600
Sea Grant Ocean Pollution	2,277	2,091	2,091	0
ERL Ocean Pollution Studies	1,500	2,490	2,490	2,218
Financial Assistance	1,407	1,407	1,426	1,426
Ship and General Support Activities	10,061	10,061	7,320	4,108
Ocean Pollution Data & Information Network	412	560	560	560
National Marine Pollution Program Office	645	680	674	683
NOAA TOTAL	35,778	36,923	34,482	16,912
DOC TOTAL	35,778	36,923	34,482	16,912

[a] Marine pollution activities at NBS are carried out on a reimbursable basis.

[b] The new configuration of marine pollution programs in NOAA under the reorganization in November 1982 is not reflected in this listing.

April 27, 1983

	FY 81 (Estimated)	FY 82 (Estimated)	FY 83 (Estimated)	FY 84 (Presidential)
DEPARTMENT OF DEFENSE				
Army Corps of Engineers				
Research and Development Programs				
Coastal Engineering	1,260	1,195	975	1,045
Flood Control & Navigation	1,300	1,505	1,380	1,040
Environmental Quality	560	3,818	4,257	5,388
Satellite & Surveying Applications	290	150	70	50
Development and Monitoring Programs				
North Atlantic Division	1,290	982	500	500
New England Division	650	800	800	700
South Atlantic Division	960	165	565	100
North Pacific Division	469	390	245	1,246
North Central Division	360	118	360	258
Lower Mississippi River Division	1,682	0	0	0
Pacific Ocean Division	0	5	70	80
South Pacific Division	0	213	505	0
Southwest Division	100	50	100	100
COE TOTAL	8,921	9,391	9,827	10,507
U.S. Navy				
Environmental Protection Technology Program	436	1,039	1,125	1,100
DOD TOTAL	9,357	10,430	10,952	11,607
DEPARTMENT OF ENERGY				
OTEC	1,730	1,040	0	0
Regional Marine Program	7,317	6,931	6,931	6,931
Radioecology	2,370	1,891	1,891	1,891
Physiological Ecology	1,039	1,206	1,229	1,229
Strategic Petroleum Reserve	6,000	3,300	4,600	4,600
Subseabed Disposal	4,780	5,900	7,500	7,500
DOE TOTAL	23,236	20,268	22,151	22,151

April 27 1983

	FY 81 (Estimated)	FY 82 (Estimated)	FY 83 (Estimated)	FY 84 (Presidential)
DEPARTMENT OF HEALTH AND HUMAN SERVICES				
National Institute of Environmental Health Services				
Intramural Program	481	455	384	412
Extramural Program	927	588	946	946
Food and Drug Administration				
Shellfish Sanitation	2,100	2,100	2,150	2,250
DHHS TOTAL	3,508	3,143	3,480	3,608
DEPARTMENT OF THE INTERIOR				
Minerals Management Service[c]				
Washington Office	1,514	1,347	2,585	2,485[d]
Atlantic OCS Region	5,552	7,823	4,342	4,442[d]
Gulf of Mexico OCS Region	6,491	3,736	4,041	4,041[d]
Pacific OCS Region	3,488	3,622	4,307	4,306[d]
Alaska OCS Region	18,323	13,734	12,613	12,614[d]
Technology Assessment and Research[e]	0	1,700	1,500	1,500
MMS TOTAL	35,368	31,962	29,388	29,388
Fish and Wildlife Service				
Fishery Research	697	705	661	661
Biological Services	400	459	105	105
Environmental Contaminants Evaluation	1,803	1,720	1,603	1,600
F&WS TOTAL	2,900	2,884	2,369	2,366
U.S. Geological Survey				
Water Resources Division	7,200[f]	6,113	5,386	5,300
Earth Sciences Application	880	504	0	0
USGS TOTAL	8,080	6,617	5,386	5,300
DOI TOTAL	46,348	41,463	37,143	37,054

[c] The MMS was formed by the reorganization of DOI in FY 1982. MMS consists of elements formerly in the Bureau of Land Management and Conservation Division (USGS).

[d] FY 1984 total budget for MMS is level, apportionment among regional studies programs may change.

[e] New program in FY 1982 resulting from reorganization of the Department of the Interior.

[f] Some projects listed in FY 1981 were not included in subsequent years due to a reevaluation of program pollution studies.

April 27, 1983

	FY 81 (Estimated)	FY 82 (Estimated)	FY 83 (Estimated)	FY 84 (Presidential)
DEPARTMENT OF TRANSPORTATION				
U.S. COAST GUARD				
Marine Environmental Protection	3,072	4,236	3,803	4,122
ENVIRONMENTAL PROTECTION AGENCY				
Marine Waste Disposal Program	2,565	6,265	6,505	6,830
Energy Related Research	6,360	375	165	0
Water Quality Research	5,655	5,730	4,080	3,790
Great Lakes Research	4,560	2,500	2,500	0
Chesapeake Bay	4,200	2,000	900	0
Exploratory Research	1,615	1,450	465	420
EPA TOTAL	24,955	18,320	14,615	11,040
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION				
Primary Productivity Program	500	1,900	2,050	0
NATIONAL SCIENCE FOUNDATION				
Division of Ocean Science[8]	2,600	2,496	2,496	2,100
NUCLEAR REGULATORY COMMISSION				
Environmental Impact Assessment Research -- Nuclear Plant Aquatic Impacts	432	265	0	0
TOTAL FEDERAL EXPENDITURE	149,982	139,640	131,368	108,790

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[8] Of the basic scientific research supported by the Division of Ocean Sciences, these figures represent the portion which is most directly pertinent to pollution considerations.

STATEMENT OF

ALAN D. HECHT
DIRECTOR, NATIONAL CLIMATE PROGRAM OFFICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

before the

SUBCOMMITEEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH
AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

March 2, 1983

Mr. Chairman and Members of the Subcommittee:

I am pleased to appear before the Committee to testify on the reauthorization of the National Climate Program. Legislation to accomplish this end will be submitted in the near future. Meanwhile, I would like to present a overview of the basic elements of the program.

Coordination of Federal agency climate activities and preparation of the Annual Report continue to be major responsibilities of the National Program Office. Increasingly, however, the office's attention and resources are committed to refining climate forecasts, providing better climate services, and promoting international cooperation in climate research, monitoring, analysis and data dissemination. During the past year, we made a major effort to respond to each of these mandates.

Experimental Climate Forecasting

Improving climate forecasts is a high priority of the National Climate Program. Our objective is to apply the results of academic and Federal research to forecasting operations of the National Weather Service (NWS). The first Experimental Forecast Center, established at the Scripps Institution of Oceanography in 1981, has developed new methods of forecasting seasonal temperature and precipitation, one of which is being studied by the NWS for possible application.

Understanding how the oceans and atmosphere interact is one key element in better seasonal climate forecasting. Recent observations and theoretical work suggest that winter conditions over North America are linked to large scale fluctuations in wind, pressure and ocean temperature over the tropical Pacific, changes associated with the Southern Oscillation and EL Nino. The Southern Oscillation reflects major changes in air pressure over large areas and is described by the difference in pressure at two Pacific Ocean stations 4000 miles apart. El Nino is a warming of ocean water temperatures off the coast of Equador and Peru in January, February and March. The two phenomena are related in yet unknown ways. During this past year there was a major change in the Southern Oscillation pattern, which started much later in the year than the previous eight events of this type, yet was one of the strongest on record with unprecedented changes in surface wind and precipitation in the equatorial Pacific.

The NWS temperature forecast for the winter of 1982-83, which correctly predicted above normal temperatures in the eastern U.S., was based in part on analysis of Pacific Ocean temperatures and rainfall patterns. Researchers at the Experimental Climate Forecast Center reached essentially the same conclusions. Looking to the future I foresee a continuing need for basic studies to deepen our knowledge of climate processes and to apply what we learn to new forecasting methods. NOAA is planning new research on the tropical ocean and global atmosphere.

The problem of matching resources to tasks requires creative ways of funding to support some of our work. For this reason, it seems appropriate to encourage the private sector to participate in testing of forecast methods. The Office is working with the University Corporation for Atmospheric Research (UCAR) to try to form an industrial consortium to help provide financial support for new experimental centers. I have met with many representatives from industry to discuss this proposal.

Improving Climate Services

The approach taken, and described in our Five-Year Plan, is a phased effort, beginning with Federal-State cooperation in projects to demonstrate the value of climate services in various institutional formats. We were able to support projects in several states and, equally important, sucessfully stimulated interest in many more states to expand and improve existing climate services.

Anticipating the need to move beyond cooperative Federal and state demonstration projects, in 1980 the Office asked the Climate Board of the National Academy of Sciences to advise on how we might fulfill the mandate of the Act. The Climate Board established a panel on intergovernmental climate programs to assist the Office in developing a program for Federal and State cooperation in climate studies and advisory services.

The panel's report, "Meeting the Challenge of Climate", was provided to us last year. I will be glad to provide copies of the report to Committee members who have not received one. The panel's major recommendation was that NCPO "take a leadership role in the development and support of a coordinated, nationwide system of climate services involving both the public and private sectors." Other recommendations were that NCPO: (1) complete the initial exploratory phase, (2) take the lead in coordinating Federal agency participation and Federal-state cooperation and (3) develop incentives for bringing state and regional climate service programs into a nationwide system.

We are looking very carefully at the panel's recommendations, particularly their recommendation that the Office take a leadership role in developing a coordinated, nationwide system of climate services involving both the public and private sectors. We need to evaluate the costs and benefits to the nation of establishing such a system. NCPO staff worked closely with the panel during the study, and we have taken some steps consistent with the recommendations. We have virtually completed the exploratory phase consisting of demonstration projects, and we are committing most of our effort to demonstrations of regional and state climate service systems.

Later this month, we will hold a conference at Florida State University in Tallahassee to discuss what needs to be done--what NOAA's role is or should be, how USDA through its State Cooperative Extension Services might help establish climate services, and how the private sector can best participate. The experience of regional climate centers, established initially with NCPO support, will be examined as one option for organizing nationwide climate services. We also will discuss how new technology can be exploited.

International Cooperation

The NCPO has been assigned responsibility for coordinating interagency participation in international climate-related activities, including the U.S. role in the World Climate Program. A prime example is the International Satellite Cloud Climatology Project (ISCCP) which is scheduled to begin in July 1983 and continue until 1988. One of its major activities will be to process GOES and TIROS-N data as well as merging the global dataset and producing the cloud parameters for the project. The NCPO has alerted agencies to support requirements, including satellite data, limited aircraft and space-shuttle flights, research studies and model development. In addition, NCPO is organizing the research community to develop a research plan for U.S. participation.

The NCPO is also coordinating and developing guidance for the U.S. position on climate issues for the forthcoming WMO Congress in May 1983. Other international activities of the NCPO have included membership in a delegation to China last September to discuss large-scale air-sea interaction and implementation of bilateral agreements with France, Spain and the USSR.

The NCPO, in conjunction with the World Climate Program Office of the WMO, also supports a project with the Oklahoma Climatological Survey to demonstrate the use of climate data with microcomputers for possible application in less developed countries. This project and other activities of the NCPO were reported at a briefing for scientific representatives of the diplomatic corps in Washington last November.

The interagency Climate Program Policy Board has been giving major attention to the multiagency climate budget request and development of guidelines for budget priorities. The Act requires periodic revision of the Five-Year Plan, and the NCPO will be undertaking a revision of the Plan this year. Board members are now reviewing the 1982 Annual Report for agency approval.

National Weather Modification Reporting Act

Public Law 92-205, enacted December 18, 1971, requires that all non-federally sponsored attempts to modify the weather in the United States be reported to the Secretary of Commerce and that the Secretary shall maintain a record and periodically publish summaries of such activities. Responsibility for administering the reporting program was delegated by the Secretary to the National Oceanic and Atmospheric Administration (NOAA). In 1973 Federal agencies agreed to report their weather modification activities to NOAA. Consequently, the reporting program provides a unique source of information on weather modification projects undertaken in the United States and its territories. The data bank contains authoritative information on past and current weather modification experiments and operational projects. Timely reporting of activities supplies information that can be used to assess the possibility of harm to persons, property or the environment, or of interference with Federal or other research projects. The data are also used to show trends in weather modification activity over the years and around the country.

In addition, NOAA's reporting program serves two functions on the international scene. On March 26, 1975, the Government of the United States and the Government of Canada signed an agreement to exchange information on weather modification activities carried out in or over the territory of either country within 200 miles of their international boundary. The Canadian Atmospheric Environment Service is designated to implement the information exchange with NOAA. On a broader scale, NOAA provides information on annual activities in the United States to the World Meteorological Organization for publication in its yearly "Register of National Weather Modification Projects".

Program Highlights in 1982

Significant progress was made in a number of areas in 1982. More detailed information on the following matters is provided in the 1982 Annual Report.

Seasonal Climate Forecasting

The National Weather Service (Climate Analysis Center) introduced a new forecast format based on the probability of warm, near normal, or cold temperatures and light, moderate, or heavy precipitation. The outlook concentrates, as much as the state of the art allows, on specific areas with large departures from the norm. New techniques also are being tested to improve the accuracy and lead-time of long-range forecasts.

In its 1982-83 three-month winter forecast (Dec.-Feb.), NWS correctly forecast warm temperatures for the eastern U.S., and cold temperatures and heavy precipitation in the West. Essentially the same forecast was made by the Experimental Climate Forecast Center. By contrast, several prominent meteorologists and climatologists had predicted severe winter conditions, even record cold temperatures, in the eastern U.S., and their forecasts were widely reported by the national media. This extreme divergence points up the difficulty of seasonal climate forecasting.

Detecting Climate Change

The Mexican volcano El Chichon erupted a year ago and ejected massive amounts of ash and sulphur containing gases into the stratosphere. The El Chichon cloud is spreading widely, possibly to the North Pole and to high latitudes in the southern hemisphere. NASA, with cooperation from NOAA, DOE, NSF and several universities is monitoring the clouds' radiation properties. In mid-year, NCPO began informally to coordinate information exchange among scientists in Federal agencies and the university community. The consensus is that it is premature to attribute any present surface climate effects to El Chichon. There is an apparent stratospheric warming due to the cloud. Some surface cooling could occur by 1984 or 1985.

More than 20 years of precise data on atmospheric CO2 have accumulated from observatories in Mauna Loa (Hawaii) and the South Pole, and the data show a yearly rise of atmospheric CO2 (0.8 ppm/yr growing to about 1.2ppm/year) at these stations through 1981. The increase is closely correlated with the increase in CO2 emissions from fossil fuel, but some fraction of it may be attributable to other causes, such as deforestation. Because of its possible long-term affect on climate, CO2 analyses continue to be a priority effort of the Department of Energy, NOAA and the National Science Foundation.

Climate Data and Related Services

NOAA has published an Interim Climate Data Inventory and installed it in a nationally accessible on-line information retrieval system. Users with simple computer terminals can access and search the inventory from hundreds of cities just by making a local telephone call. Preparation of the inventory is an early step in establishing a climate data and information clearinghouse.

Following the extensive heat wave of 1980, the Community Services Administration asked NOAA for current weather and climate data to help it anticipate the need for emergency aid. NWS now also makes daily calculations of the temperature-humidity index (wind-chill in winter) for hundreds of U.S. cities. Other important climate data products include the Palmer drought index (PDI) and the crop moisture index (CMI), both reported in the *Weekly Weather and Crop Bulletin* published jointly by the Departments of Commerce and Agriculture. PDI is a measure of prolonged moisture deficiency; CMI is a measure of week-to-week change and is an indicator of current moisture available for crops.

Assessment of Climate Impacts

NOAA's report *U.S. Economic Impact of the Severe Winter of 1982*, attributed $8.2 billion in losses to inclement weather. The report compared these losses with those from other major meteorological events: $36.7 billion due to the severity of the winter of 1976-77, and $8 billion due to the 1980 heatwave. The report was widely reported in the national media, and copies were requested by many government offices, businesses and universities. The utility of these assessments is in identifying and anticipating those sectors of the economy most affected by severe climate events.

The Department of Agriculture's World Agriculture Outlook Board (WAOB) has expanded its early-warning capability. Agricultural meteorologists at WAOB use information provided by the National Weather Service about global weather conditions to make world-wide crop assessments. A NWS meteorologist assigned to the Joint Agricultural Weather Facility in USDA devised a three-category snowcover approach to use satellite data in monitoring winter kill of wheat until the World Meteorological Organization can routinely provide snow-depth data.

The Agricultural Research Service (USDA) continues its research on plant responses to environmental changes. The studies include climatology of dry-day frequencies, short-period rainfall intensities, hot wind effects, elevated rainfall, elevated CO2 levels, changing soil tillage practices and varying levels of ozone concentration, to mention a few. Significant work continues in developing models for assessing plant-soil-atmospheric interactions and the utility of remote-sensed data.

NOAA/National Marine Fisheries Service (NMFS) continued research on a wide range of climate-induced effects on size and distribution of fisheries. Because of the vulnerability of fish in their early life stages, research has been concentrated on egg, larval and juvenile phases. A good estimate of first-year survival is important for management of each year-class as it enters the fishery.

In conclusion, the National Climate Program, now in its fifth year, is firmly established and has made considerable progress in meeting the goals mandated by the Act. The United States has a well-defined and coordinated program of domestic and international activities in climate-related research, monitoring, assessment and utilization of information.

Mr. Chairman, this concludes my prepared testimony. I will be glad to answer your questions.

Statement by Honorable Don Bonker
3rd District - Washington
before the
House Committee on Science and Technology
Subcommittee on Natural Resources,
Agricultural Research, and Environment
Honorable James H. Scheuer, Chairman
March 9, 1983.

Chairman Scheuer,

I was distressed to learn that the Administration's Fiscal Year 1984 budget request for the National Oceanic and Atmospheric Administration would cut the Fire Weather Program in half. This reduction would mean the elimination of the Fire Weather Office in Olympia, Washington, which provides vital fire weather information for the western half of Washington State.

Mr. Chairman, this proposed reduction is a false economy and reflects the Administration's inverted sense of priorities. I urge the committee to restore funding for the Fire Weather Program.

In Washington State, as in other areas of the Northwest, the economy is heavily dependent upon timber. The nation depends on our forests to provide lumber, pulp and other essential forest products. We in the Northwest depend upon these trees for our livelihoods, natural beauty, erosion and flood control, and recreation.

Fire is the greatest single threat to our forests. Each year hundreds of thousands of acres of valuable timber are lost to forest fires. Many more acres would be burned without effective firefighting and prevention efforts. The Fire Weather Program is a vital link in the effort to prevent and control forest fires.

In my district, the Olympia Fire Weather Office is manned by two federal and one state meteorologists. Eliminating the facility might save the federal government a few thousand dollars a year, but could jeopardize the human lives, homes, and millions of dollars of timber which are threatened by fire every year. In addition to providing essential weather information for firefighting, the facility provides important information for smoke management and controlled burning, and helps to determine the degree of fire hazard for various areas in the State during the fire season.

Mr. Chairman, I trust the committee will give careful consideration to the benefits provided by the Fire Weather Program and restore the cuts in the Program proposed by the Administration.

Statement of the California Raisin Advisory Board

Before the
House Science and Technology
Committee, Subcommittee on
Natural Resources, Agriculture
Research and Environment

Hearings to Review Authorization
of the National Oceanic and
Atmospheric Administration

The California Raisin Advisory Board (the Board), under the auspices of the California Department of Food and Agriculture oversees the state marketing order for raisins. The Board represents over 4500 producers and processors of raisins who account for 100% of the U.S. and 30% of the world production.

The Board takes an active interest in matters of vital concern to the raisin industry including generic advertising, promotion and funding for research and producer information programs. We appreciate this opportunity to present a statement for the record strongly supporting the continuation of the Fruit Frost Forecast and Advisory Service.

For over 60 years, the Fruit Frost Program has provided the multibillion dollar fruit and vegetable industries in California, Arizona, Texas and Florida with accurate, site-specific minimum temperature forecasts and other advisory services. Armed with these detailed forecasts in advance of a frost, growers are better able to take the steps necessary for avoiding frost damage to crops. The "zone weather forecast" provided by the National Weather Service cannot take the place of The Fruit Frost Service as zone forecasts are not site-specific, and thus are of minimal use to the growers. It should also be pointed out that to the above states covered by the Fruit Frost program, commercial agriculture in every state uses and depends on timely and accurate weather information.

The Fruit Frost Service consists of highly trained agricultural meteorologists who closely monitor weather patterns which could be potentially devastating to frost sensitive crops. Information is gathered on a daily basis from numerous sites and carefully analyzed by meteorologists who then make site-specific forecasts for the various locations within their region. These forecasts are made available to the public through television, radio and telephone recorders.

The Fruit Frost Service is extremely important to the California raisin industry as more than 80% of the U.S. production is in a 500 square mile area in Fresno County, with the remaining 20% scattered throughout the state. With such a large percentage of the national crop concentrated within a small region subject to particular weather changes, the California raisin industry depends heavily upon the Fruit Frost Service for accurate and timely site-specific forecasts. It is estimated that in the San Joaquin Valley alone, the Fruit Frost Forecast and Advisory Service saves the industry roughly 10% of the crop value through more efficient use of irrigation, reduced and better time sprays and nutrients, and accurate forecasts provided during the harvesting and drying period.

The California Fruit Frost Forecast and Advisory Service covers those areas where frost sensitive crops are grown, from the Northern Sacramento Valley to the Mexican border. It is estimated that over $1 billion of the $15 billion California agricultural output is frost sensitive. Further, the estimated annual crop-loss savings in California alone approaches $70 million.

The California Raisin Advisory Board is deeply concerned with the Department of Commerce's decision to eliminate the Fruit Frost Forecast and Advisory Service. This $418,000 program returns millions of dollars in lost crop savings to the producer and consumer each year. In fact, program audits indicate that the Fruit Frost Service has the highest cost-benefit ratio of any division within the National Weather Service. Further, it would be extremely difficult, if not impossible for the private sector to take over this program without an interruption in service, and provide the same high quality service in a accurate and cost effective manner. Additionally, any move to the private sector would undoubtedly result in a disruption of service. If an interruption in service occurs, the losses to both producers and consumers could quickly run into millions of dollars.

The California Raisin Advisory Board strongly urges this Committee to re-evaluate the Commerce Department's decision to end this valuable program. We implore this Committee to recommend continued funding of the Fruit Frost Program. To this end, we recommend that the program be reauthorized for a minimum of three years at current funding levels with appropriate increases for inflation and employee benefits.

Respectfully submitted,

Clyde E. Nef
Manager
California Raisin Advisory Board

Before the
House Science and Technology
Committee, Subcommittee on
Natural Resources, Agriculture
Research and Environment

Hearings to Review Authorization of the National
Oceanic and Atmospheric Administration

STATEMENT OF THE CALIFORNIA-ARIZONA CITRUS LEAGUE

My name is William Quarles and I am President of the California-Arizona Citrus League (The League).

The League is a voluntary, non-profit trade association composed of marketers of California-Arizona citrus fruits. Members are farmer cooperatives and independent shippers representing over 75% of the 10,000 citrus fruit growers in Arizona and California. These growers produce oranges, lemons, grapefruit, tangerines and limes.

The League appreciates the opportunity to present its views on a matter of industry concern, namely the need to preserve the Fruit Frost Forecast and Advisory Service Program. The Fruit Frost Program, administered by the National Oceanic and Atmospheric Administration provides citrus and fresh vegetable growers in California, Arizona, Florida, and

Texas with detailed site-specific minimum temperature forecasts and other advisory services that support implementation of measures for avoiding or lessening frost damage to crops. While "zone forecasts" issued by the nearest National Weather Service forecast office for the areas involved include both maximum and minimum forecasts, such forecasts are not site-specific and thus are of marginal use to farmers now served by the Fruit Frost Program.

The Fruit Frost Program consists of trained agricultural meteorologists who monitor weather conditions which could damage crops. Information is gathered on a very detailed basis--often down to the square mile--and is disseminated to interested persons through television, radio and telephone recorders. For example, the California Fruit Frost Service covers those areas where frost sensitive crops are grown, from the Northern Sacramento Valley down to the Mexican border. Of the $15 billion worth of California agriculture, over $1 billion is frost sensitive. The estimated annual crop-loss savings in California alone approaches $70 million.

The National Weather Service estimates that there are approximately $1.6 billion in weather-related crop losses each year. In addition, weather impacts other areas of agriculture by causing reduced yields associated with plant and animal diseases, insects, pollution and water use. These additional weather-related losses are estimated by the National Weather Service at $9 billion annually. While these losses cannot be avoided entirely, it is possible to reduce agricultural losses significantly through better forecasts and information.

The Fruit Frost Forecast and Advisory Program in California has been in existence for over 60 years, serving many segments of California agriculture extremely well. Indeed, program audits have shown that of all the Weather Service programs (which provide an estimated return of $20-30 in crop and livestock savings for every dollar spent) the Fruit Frost Program has one of the highest cost-benefit ratios. Additionally, the Fruit Frost Program provides much more than minimum temperature forecasts. It provides complete weather advisory forecasts to the agricultural community. It also provides information on spray and dusting weather, winds, high temperatures, humidity, rainfall and rainfall amounts, and orchard dry times.

The information provided by the Fruit Frost Program is also of importance in the various Integrated Pest Management (IPM) Programs which have been implemented in the past several years. An important factor in these IPM Programs is accurate and timely weather data. Without good weather data we cannot accurately predict insect and disease life cycles. Therefore, we cannot effectively time control measures where warranted.

The members of the League were most distressed to learn of the Administration's proposed elimination of this vital program again this year. The League's members are also puzzled as to why this program has been targeted for elimination. Under the continuing resolution, the Program is funded at $418,000 for the current fiscal year. As noted above, the benefits produced by the program far exceed its small cost. Further, it would be very difficult, if not impossible for this program to be operated by the private sector without an interruption in service. It must be remembered that even one year's break in service could prove disastrous to the agricultural community and the consumers of the nation. The successful operation of this program requires skilled personnel to conduct the forecasts together with the technical hardware necessary to develop the required data. Both of these items are not presently available in the private sector.

The League strongly urges that the Committee correct the shortsightedness of the Commerce Department in proposing to eliminate the Fruit Frost Program. We suggest that the Program be reauthorized for a three to five year period, at current funding levels with appropriate increases for inflation and employee benefits.

Respectfully submitted,

William K Quarles, Jr

William K. Quarles, Jr.
President
California-Arizona
Citrus League

NATIONAL COTTON COUNCIL OF AMERICA
EXECUTIVE BUILDING / 1030 FIFTEENTH STREET, N.W. / SUITE 700
WASHINGTON, D.C. 20005
TELEPHONE: (202) 833-2943

March 9, 1983

The Honorable James H. Scheuer, Chairman
Natural Resources, Agriculture Research
and Environment Subcommittee
Committee on Science and Technology
U.S. House of Representatives
Washington, D. C. 20515

Attention: Bob Palmer

Dear Mr. Chairman:

The National Cotton Council respectfully submits this letter to be included as a part of the record of your subcommittee's March 9 hearing on the National Oceanic and Atmospheric Administration budget.

The Council is the central organization of the cotton industry, representing producers, processors, handlers, and manufacturers from the Carolinas to California.

At a recent annual meeting involving some 1500 industry leaders, the following resolution on agricultural weather services was unanimously adopted:

> Support continued federal funding for agricultural weather services and work with other groups to improve services; and urge implementation of the National Weather Service's plan with the inclusion of a service center at Lubbock, Texas.

Accordingly, we strongly object to the National Weather Service proposal to eliminate the Agricultural Weather Program in fiscal 1984. This highly valuable program -- though presently operating on a relatively small $1 million budget -- saves farmers hundreds of millions of dollars each year and means untold savings to consumers in terms of increased production and lower prices.

A National Aeronautics and Space Administration grant study by Priddy and Marlatt of Colorado State University in 1978 showed that the availability of timely weather information meant a potential 16% savings in the cost of growing cotton in Mississippi. In 1981 that amounted to nearly $57 million in savings for only one crop in one state.

Weather has to be taken into consideration in every farming operation. For example, land preparation immediately prior to planting may have to be repeated if a heavy rain intervenes. An insecticide application may have to be done over if rain washes it off before it has time to act. Or a pre-harvest defoliant application may be wasted if frost comes within a few days and causes natural defoliation. With today's high fuel and chemical prices, each such operation may cost as much as $10 or more per acre.

Just one facet of the many practical benefits that have come from the Agricultural Weather Program is the computer model for rice crops developed in cooperation with the extension services and experiment stations in Mississippi and Arkansas. Some 2,240 growers with 588,000 acres of rice used the service last year and now enthusiastic growers and extension workers want similar models developed for cotton and other major crops of the region.

It is ironic that the proposal to end the program should come at a time when farmers have had two successive years of financial losses, the first due to drought in 1980 and the second due to unusually low prices in 1981-82. It is also ironic that the proposal comes soon after plans were formulated for a much improved long-range program following a two-year development effort by the Agricultural Weather Service, the land-grant colleges, and industry organizations like our own.

The Administration's position on agricultural weather services is not consistent with 1982 reports from two prestigious groups. In a special report (The Future of the Nation's Weather Services: A Special Report to the President and the Congress. National Advisory Committee on Oceans and Atmosphere. July 1982), a continuing federal role was advocated providing specialized analyses and forecasts that serve broad economic sectors especially where there is a high national interest as defined by Congress. The Committee further said that because benefits of agricultural weather services are so widely distributed over such a broad segment of the population, and because agriculture is so central to national welfare, it was frivolous to propose charging user fees for such services as was done in the FY '83 budget.

In its report (Meeting the Challenge of Climate. Panel on Intergovernmental Climate Programs; Climate Board; Commission on Physical Sciences, Mathematics, and Resources; National Research Council; National Academy of Sciences. 1982), the panel on climate programs said that production, harvesting, processing and marketing of agricultural commodities are the most climate-sensitive industries in our economy.

Agricultural weather information is an essential input to the food-feed-natural fiber production system of this country and has contributed to its continued increases in productivity beyond that of any other major segment of our economy. This increasing productivity has resulted in U.S. consumers paying less of their disposable income for food than almost every other country. In addition, exports of U.S. agricultural products, which amounted to $39 billion in FY 1982, are a major positive factor in our nation's balance of payments.

Some people may question the need for continuing emphasis on productivity in view of the current excess supply of most commodities. However, it must be understood that present surpluses are temporary and are caused by record yields in 1982 stemming mainly from unusually favorable weather at a time when worldwide recession reduced demand.

American agriculture is broad and diverse, totaling several million farmers and ranchers involved in producing a wide variety of crops and livestock. The size of agricultural operations varies widely but most farms and ranches are small family operations. Just as weather varies from one agricultural area to another, the specific agricultural weather service needs vary.

We believe that it is impractical for these broad and diverse agricultural communities to organize and effectively provide their own weather services. For the same reasons, we do not believe that federal agricultural weather services provided on a fee basis is practical nor do we expect private sellers of agricultural weather services to fulfill the weather service needs of American agriculture.

We strongly urge that you and your subcommittee take action to continue the highly valuable Agricultural Weather Services Program in fiscal 1984 and in future years.

Sincerely,

GBBrewer

Gerald B. Brewer
President

TITLE: “ADDITIONAL COST-BENEFIT INFORMATION ON AGRICULTURAL WEATHER SERVICES”

Fruit Frost

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service Western Region
P. O. Box 11188 Federal Building
Salt Lake City, Utah 84147

March 17, 1982

Dr. Gary Obernauf
Director of Research
Raisin, Prune, and Nut Industry
P. O. Box 5335
Fresno, California 93755

Dear Dr. Obernauf:

Enclosed you will find notes supporting our analysis of the dollar value of agricultural services in the West. These are being sent for your review and in response to your request. It is unfortunate that we have not had the opportunity to put these in a formal paper, but we do feel, nevertheless, very comfortable with the numbers. As you know, they are based on percentage estimates of total crop value given us by a wide spectrum of users. These have included growers, extension service personnel, land-grant university researchers, and others that are intimately familiar with the services the National Weather Service provides to the agricultural industry.

If we can be of any further assistance, please don't hesitate to contact us.

Sincerely,

Richard J. Hutcheon, Acting Chief
Meteorological Services Division

Attachment

November 13, 1981

Dr. John V. Byrne
Administrator, NOAA

OA/WFW - H. H. Bedke

Slides/Statistics Used in Western Region Briefing to Administrator

As you requested, we are sending some of the slides with statistics which were presented to you on meteorological services provided in the Western Region. Included with the statistics are explanations of how the information was derived. If further questions come up as the data are reviewed, please contact me at FTS: 588-5122 or Herbert P. Benner, my Chief of Meteorological Services (FTS: 588-4000).

Attachments

cc: OA/W - Richard E. Hallgren
OA/W1 - Gerald A. Petersen

NWS WESTERN REGION PROGRAM NOTES

FIRE WEATHER

Costs of fighting wildfire — $1/2 billion annually.

Cost of single fire control as high as $1/2 million/day, e.g., 5,000 men plus equipment on NAPA Valley fire.

Virtually all accidental deaths directly associated with major wildfires now weather related.

On-scene weather support increases efficiency and safety—2-7 days reduction in time required to control fires.

WR ran 42 mobile unit operations in 1981, on-site fire support cost — $125,000 producing savings of $12,600,000 - $31,500,000.

Millions of $ and manhours going into management burns. All require weather support to control for results and to prevent escape, e.g., California burning 90-120,000 acres annually.

Fire control agencies indicate they must have weather support either from NWS or produced internally.

NWS has organization and experience to provide high-quality, low-cost program.

NWS WESTERN REGION PROGRAM NOTES

AGRI-METEOROLOGY

WR producing Agricultural Weather Advisories (AWAs) from nine offices--program steadily expanding.

AWA results of combined efforts of NWS, growers, Ag advisor, land-grant universities.

AWAs provide innovation, broad-based support to Ag.

Frost forecasts and warnings--subset of Ag program--covers 28 Ag districts in 6 states.

Value of all weather support to Ag, just in California in excess of $250,000,000.

Value of frost program in California estimated in excess of $70,000,000.

Value of all weather support, to field crops only, in Washington state estimated in excess of $50,000,000.

Conservative estimate of weather support to Agriculture in Western Region: $300,000,000.

High $ example: single update of frost forecast allowed $1,000,000 save under clearing skies--sufficient lead time to bring in helicopters.

High $ example: short series of AWAs credited with $400,000 save in Utah sweet cherries.

High $ example: series of AWAs helped increase Salinas Valley wine grape crop >$40,000,000.

Value of weather support to Ag ranges from 4-20% of gross crop value, e.g., 4% deciduous fruits - 20% citrus fruits.

Large percentages of National crop can be concentrated in small area sensitive to particular weather regimes, i.e.,

92% grass seed - Willamette Valley
25% green beans - Willamette Valley
>80% raisins - Fresno area
Wine grapes from California.

WESTERN REGION AGRI-METEOROLOGY PROGRAM

The Agricultural production of the United States and the efficiencies of operation that allow for profitable farming help establish and maintain the position of the United States in world trade and influence. The NWS is charged with support of the commerce of the United States. Our weather support to agriculture clearly falls within this mandate.

steadily [illegible]

The value of the Western Region Agri-Meteorology Services, like any other NWS program, is most difficult to pin down. It can best be judged by attempting to measure its beneficial affects or impact on users. Grower estimates can be suspected of bias. WR asked Ag commissioners, advisors, and university research and support facilities for estimates of the percentage of gross crop value contributed by weather support. Small, conservative estimates yield very high dollar totals.

i.e., Washington field crop impact: 5-10%
field crop value: $1 1 billion

California citrus crop impact: up to 20%
citrus crop value: $0.7 billion

San Joaquin: raisin crop impact: 10%
raisin crop value: $0.7 billion

These impacts come about through savings produced by more efficient use of irrigation, reduced and better timed sprays and nutrients, and energy costs of frost protection. They also arise in better planning and use of labor and capital equipment.

ESTIMATED PERCENTAGE CONTRIBUTION OF ALL AG WEATHER SERVICES TO TOTAL CROP VALUE IN STATE OF CALIFORNIA ONLY

CATTLE/CALVES.....1/100%. We are providing some direct support through general forecasts and Stockmens Advisories. Also support advisories for hay crops. Need to increase support.

DAIRY.....1/100%. Grazing guidance, feed availability, environmental control of barns. Need to increase contacts and support.

NURSERY.....1%. Benefit strongly from frost and general advisories.

FRUIT.....11%. Citrus has learned through the years of our service to use and depend on us for frost, labor, irrigation, spraying, and harvest guidance. An impact likely near 20%. Deciduous similar, but with less dependence, say 4%. Crops near equal value so average 11-12%.

GRAPES.....3%. Frost, labor, spraying, irrigation and a big harvest impact possible. Much higher for raisins.

COTTON.....1%. Planting temps, pest control, defoiliation and harvest (labor).

FRESH VEGETABLES.....5%. Much higher in some locations with ice and dew forecasting, pest control temps and winds, irrigation and harvest guidance.

	CROP VALUES FOR 1980 ($ MILLIONS)	% IMPACT	Estimated Value ($ MILLIONS)
CATTLE	1,537	0.0001	0.15
DAIRY	1,555	0.0001	0.16
GRAPES	1,433	0.03	43.0
NURSERY	498	0.01	4.98
COTTON	1,225	0.01	12.3
FRUIT			
CITRUS	664	0.18	120.0
DECIDUOUS	768	0.03	23.0
VEGETABLES	2,506	0.025	62.7
			$266,290,000

NOVEMBER 1981 UPDATES ON CALIFORNIA, WINTER AND SPRING, FROST/AGRICULTURAL FORECAST DISTRICTS

1. Northern Sacramento Valley District

   a. Primarily a spring frost district, but with significant enough citrus to also require winter frost information.

2. Fresno-Madera County District (WSO Fresno)

   a. Citrus Value: $55,000,000 (X18%=$9,900,000)
   b. Total winter/spring frost-sensitive (only) crop value: $932,000,000 (X3%=$2,796,000)

3. Tulare County District

   a. Citrus Value: $190,000,000 (X18%=$34,200,000)
   b. Total winter/spring frost-sensitive crop value: $661,000,000 (X3%=$1,983,000).

4. Kern County District (WSO Bakersfield)

   a. Citrus Value: $59,000,000
   b. Total winter/spring frost-sensitive crop value: $465,000,000

5. Santa Maria District (WSO Santa Maria)

   a. Citrus Value: $5,000,000
   b. Total winter/spring frost-sensitive crop value: $20,000,000

6. Ventura/Santa Barbara County District

   a. Citrus Value: $179,000,000
   b. Total winter frost-sensitive crop value: $308,000,000

7. Orange County District

   a. Total Citrus Value: $33,000,000
   b. Total winter frost-sensitive crop value: $50,000,000

8. Redlands District (WSO Riverside Office)

   a. Total Citrus Value: $15,000,000
   b. Total winter frost-sensitive crop value: $22,000,000

9. Corona District

   a. Citrus Value: $50,000,000
   b. Total winter frost-sensitive crop value: $56,000,000

10. San Diego County (WSO San Diego)

    a. Citrus Value: $42,000,000
    b. Total winter frost-sensitive crop value: $120,000,000

11. Coachella-Palo Verde Valley District

    a. Citrus Value: $35,000,000
    b. Total winter/spring frost-sensitive crop value: $152,000,000

12. Imperial Valley District

    a. Citrus Value: $5,000,000
    b. Total winter/spring frost-sensitive crop value: $135,000,000

REFERENCES FOR ESTIMATES FOR AGRICULTURAL WEATHER SERVICES VALUE

CALIFORNIA

Paul Lavine
Director of Extension
Stanislaus County
(209)526-6654

Richard McPhail
Extension Agent
Ventura County
(805)525-3371

William Hambilton
Director Fresno County
Extension Service
(209)453-5931

Cosmo Insalaco
Ag Commissioner Fresno County
(209)453-5960

Richard Rominger
California Dept. of Fruit
and Agriculture
(714)832-5241

Paul Stephany
Executive Secretary
California Farm Bureau
(714)832-5333

WASHINGTON

Washington State University at Pullman

Dr. Gale Willit
FTS 445-2511

Dr. Leroy Rogers
FTS 445-5555

Dr. Ken Morrison
FTS 445-2511 Ex. 258

APPENDIX II

Questions and Answers Submitted for the Record

Questions from Congressman Scheuer
To Administrator Byrne

FOR MARCH 1 HEARING RECORD

NOAA's FY 1984 Budget Request

1. GENERAL QUESTIONS

Question #1

How large are NOAA's proposed personnel cuts in the FY 1984 budget? How have NOAA personnel levels changed over the past 5 to 10 years with respect to other government research and services agencies?

Answer

NOAA is proposing a reduction of 1255 positions in the FY 1984 budget. NOAA positions have decreased from 12,505 in FY 1974 to 11,125 as reflected in our FY 1984 budget request. We have no detailed information on the position trends in other government research and services agencies.

Question #2

The budget proposes to eliminate funding (approximately $500,000) for the Congressionally mandated National Advisory Committee on Oceans and Atmosphere, chartered to provide the President and the Congress with an independent view of needs in ocean and atmospheric research and services. In the past year, NACOA has released several reports critical of the Administration's proposed budget reductions, including reports on weather services and on an ocean satellite system.

-- Why are you proposing to eliminate NACOA?

Answer

The proposal to eliminate funding for NACOA is consistent with the Administration's efforts to reduce the number of Federal Advisory committees, particularly where these duplicate the work of other Federal agencies. Many of the NACOA reports and advisory services have preimarily addressed policy and management issues which were not very useful to NOAA or the Department of Commerce in the management of oceanic and atmospheric programs. The results of the NACOA studies have consisted of a very general overview and have not been very useful for program planning. Review of the Nation's atmospheric and marine policies and programs can be effectively carried out by the involved agencies and through other existing mechanisms such as advice from: the National Academy of Sciences, the National Research Council, the Marine Board, the National

Ocean Industries Association, university associations, industry associations, environmental and conservation groups, private consulting firms, ad hoc committees, and various other means.

Question #3

You have proposed increased user fees in FY 1984 for aeronautical and nautical charts, for aviation weather, and for Landsat data.

a. When will you submit proposed legislation dealing with these issues?

b. Do the total for our FY 1984 budget assume that these bills will be passed during the 98th Congress?

c. What is your plan for phased price increases with regard to these services?

Answer

a. Attached is draft legislation forwarded to Congress on this issue.

b. Yes.

c. During FY 1984, NOAA will implement a program leading to cost recovery of nautical and aeronautical charts. Chart prices will be increased by 20 percent for nautical and 25 percent for aeronautical charts for the costs of data acquisition and compilation.

Question #4

There have been past criticisms of NOAA's inadequacies in transferring research results to NOAA's operational units or to others that might make use of the research results. In testimony last year, you indicated that NOAA has initiated a five-year plan to improve the "definition and application of research to operations."

a. What is the status of this plan?

b. What initiatives have you taken to enhance communication and use of your results?

Answer

a. In order to improve the definition and application of research to NOAA programs and services, the Office of Oceanic and Atmospheric Research (OAR) is coordinating the development of a NOAA-wide five-year R&D plans in seven major program areas. Plan sections on Climate R&D and Ocean Services R&D have been transmitted to the Assistant Administrator for OAR. A second draft has been completed of a plan section in Atmospheric

A BILL

To amend Title 44, United States Code, to authorize the Secretary of Commerce to establish prices charged for charts, tide and tidal current tables, tidal current charts and coast pilots (and associated data bases) published or produced by the National Oceanic and Atmospheric Administration, and for other purposes.

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That section 1307 of Title 44, United States Code, relating to the sale and distribution of charts and associated reference materials published by the Environmental Science Service Administration, is amended-

(1) by striking out subsection (a) and inserting in lieu thereof the following: "All aeronautical and nautical charts, tide and tidal current tables, tidal current charts, coast pilots and associated data bases (hereinafter nautical and aeronautical products) created or published by the National Oceanic and Atmospheric Administration (hereinafter NOAA) shall be sold at such prices as may be determined by the Secretary of Commerce, provided that the price established for a

nautical or aeronautical product shall at least include costs attributable to product reproduction and distribution. The Secretary of Commerce shall establish and publish annually the prices at which nautical and aeronautical products are sold.

This section shall not be construed to require the imposition of fees for a nautical or aeronautical product where, in the judgment of the Secretary of Commerce, furnishing of that product to a recipient is clearly a reasonable exchange for a voluntary contribution of information by the recipient to a NOAA program.";

(2) by striking out subsection (b) and inserting in lieu thereof the following: "The revenues earned from the sale of nautical and aeronautical products shall be deposited in miscellaneous receipts of the Treasury.";

(3) by adding new subsection (c): "Notwithstanding the limitations contained in section 105 of Title 17, United States Code, the Secretary of Commerce may assert copyright on behalf of the United States as author and proprietor in all or any part of any nautical or

aeronautical product created or published by NOAA and may authorize the reproduction and publication thereof by others. Copyright may be asserted pursuant to this section only in a product with respect to which the Secretary of Commerce has made one or more of the following determinations: (1) that the product price will be established at a level calculated to recover costs in excess of reproduction and distribution costs; (2) that assertion of copyright in the product is desirable to promote public safety or protect product reliability; or (3) that assertion of copyright is desirable to provide an incentive for private vendors to produce or distribute a nautical or aeronautical product.";

(4) by adding new subsection (d): "The Secretary of Commerce may distribute nautical and aeronautical products without charge to each foreign government or international organization with which the Secretary or the Administration has an agreement for exchange of these products without cost and to the departments and officers of the United States requiring them for official use."; and

(5) by adding new subsection (e): "The fees provided for in this Section are for the purpose of reimbursing the United States government for the costs of creating or publishing NOAA aeronautical and nautical products. The collection of fees authorized by this Section shall not alter or expand the duties and liability of the United States under existing law for the performance of functions for which fees are collected. Nor shall the collection of fees constitute an express or implied undertaking by the United States to perform any activity in a certain manner."

Section-by-Section Analysis

Paragraph (1) of the bill authorizes the Secretary of Commerce to establish prices for aeronautical and nautical charts, tide and tidal current tables, tidal current charts, coast pilots and associated data bases created or published by NOAA, and requires that the price at least include reproduction and distribution costs attributable to the product. This section does not preclude the Secretary from providing products at reduced prices, or without charge, in situations where furnishing of the product on that basis is clearly a reasonable exchange for a voluntary contribution of information by the product recipient.

The products covered are specifically named to avoid the uncertainties associated with the phrase "associated reference materials" formerly found in this Section. The Secretary of Commerce is also required to publish nautical and aeronautical product prices annually.

Paragraph (2) of the bill provides that revenues from sales will no longer be credited to the account that incurs the expense of producing aeronautical and nautical products but will be deposited in miscellaneous receipts of the Treasury. This provision does not preclude NOAA from producing special products for other Federal agencies (not otherwise accounted for in the NOAA budget) on a reimbursable basis pursuant to existing authorities. Instead, the intent of this section is to ensure that revenues derived from products funded directly from NOAA budget authorities for charting and tidal/current programs will be deposited in miscellaneous receipts.

Paragraph (3) of the bill authorizes the Secretary of Commerce to assert copyright on behalf of the United States as author and proprietor in all or any part of any nautical or aeronautcal product created or published by NOAA, provided the Secretary of Commerce has made one of three determinations.

The first determination is that the price of the product will be established at a level calculated to recover costs in excess of reproduction and distribution costs. Assertion of copyright in this situation is appropriate to enable the Federal government to recover from special users those costs attributable to the nautical or aeronautical products provided.

The second determination is that assertion of copyright is desirable to promote public safety or protect product reliability. Promotion of public safety is one reason for producing charts and other products. Assertion of copyright will allow NOAA, by use of a copyright license, to avoid distortion, inaccuracy or lack of timeliness in the production and distribution of the information product.

The third determination is that assertion of copyright is desirable as an incentive for private vendors to produce or disseminate a nautical or aeronautical product. Copyright in this situation will further NOAA dissemination objectives by providing an incentive for private vendors to distribute high-quality, reasonably-priced nautical and aeronautical products.

Paragraph (4) of the bill authorizes the Secretary of Commerce to distribute products without charge to each foreign government or international organization with which the Secretary or the Administration has an agreement for exchange of these products and to the departments and officers of the United States requiring them for official use without cost.

Paragraph (5) of the bill states that collection of fees for NOAA aeronautcal and nautical products does not alter the duties and liabilities of the United States.

STATEMENT OF PURPOSE AND NEED

The National Oceanic and Atmospheric Administration (hereinafter NOAA) (successor to the Environmental Science Service Administration as a result of Reorganization Plan No. 4 of 1970) is the agency in the Department of Commerce responsible for the production and distribution of nautical and aeronautical charts, tide and tidal current tables, tidal current charts and coast pilots. These charts and tables are produced for private users and Federal agencies in the interests of safe and efficient navigation of marine and air commerce and of national security.

Section 1307 of Title 44, United States Code, restricts the prices at which charts and related reference materials are sold to the public to costs of reproduction and distribution. Other production costs, including costs of compilation and data acquisition, are funded through general tax revenues.

Section 1307 was passed in its present form in 1964 (P.L. No. 88-441, 78 Stat. 446). The primary purpose of the 1964 legislation was to require the Secretary of Commerce to expand the category of costs recovered to include all elements of reproduction and distribution, in order to assure that private producers of charts and related reference materials could compete with NOAA products. (Senate Rept. No. 1061 on S. 1336, June 5, 1964.) However, section 1307 also provides that costs of basic survey and geodetic work may not be included in the cost of charts.

The latter restriction on cost recovery is limiting the ability of NOAA to adjust the price of nautical and aeronautical products to reflect more accurately the cost involved in producing the information. The purpose of this legislation is to provide the Secretary of Commerce with additional flexibility to adjust prices of products provided to users by removing the ceiling on recoverable costs, while maintaining the minimum charges established by Congress in 1964.

Aside from recovery of reproduction and distribution costs, no specific levels or items of cost recovery are required by the legislation. It is intended that the Secretary have authority to evaluate and establish prices on an annual basis, including discretion to implement gradual price increases taking into consideration safety, marketability, product improvement, or other considerations relating to program objectives.

As drafted, the legislation would give the Secretary of Commerce authority analogous to that presently residing in the Defense Mapping Agency (10 U.S.C. 7394) and the Geological Survey (43 U.S.C. 42) for similar products.

This legislation also provides another exception to section 105 of Title 17, United States Code, which prohibits Federal agencies from asserting copyright in agency-produced products. Precedent for allowing the Department of Commerce to assert copyright in information products exists in section 290e of Title 15, United States Code, which authorizes the National Bureau of Standards to secure copyright in standard reference data products. The legislation authorizes the Secretary of Commerce to assert copyright in NOAA-produced nautical and aeronautical products in three situations: (1) where product price will be established in excess of publication and distribution costs; (2) where copyright is desirable to promote public safety or protect product integrity; or (3) where copyright is desirable to provide an incentive for private vendors to produce or distribute a nautical or aeronautical product.

Authority to assert copyright in nautical or aeronautical products is necessary to promote NOAA program objectives of cost recovery, public safety and dissemination.

Cost Recovery

In order for NOAA to conduct a successful program of cost recovery, increases in prices of aeronautical and nautical products to a level in excess of publication and distribution costs must be accompanied by copyright protection of the NOAA products involved.

Without copyright protection, private or public parties who incur only reproduction and distribution costs can reproduce, distribute or sell multiple copies of NOAA products, at prices lower than the cost to the government of producing the product, without further payment by users to the Federal government.

As NOAA prices increase to reflect costs attributable to all aspects of production, NOAA anticipates that, without copyright protection, users will increasingly purchase products at lower cost from private vendors rather than the Federal government. As a result, the general public will pay larger subsidies to support NOAA activities without receiving commensurate public benefits.

Copyright would enable NOAA to meet cost recovery objectives by assessing royalties to private vendors, and would also allow NOAA to avoid similar problems on the international level by taking advantage of protections afforded by copyright laws of other nations and by international agreements relating to copyright to which the United States is a party.

Safety and Product Reliability

In programs such as nautical and aeronautical charting, in which critically evaluated scientific data is produced by NOAA and periodically revised for safety purposes, copyright is also needed to ensure the accuracy, quality and timeliness of the product. NOAA is presently powerless to prevent misuse of its products and the attendant lack of reliability and/or safety risk from misinformation.

NOAA has a statutory mission to provide charts and related information for the safe navigation of marine and air commerce (33 U.S.C. 883a). However, NOAA has no authority to prohibit widespread sale of outdated chart editions or of other products which omit important, safety-related navigational changes.

Copyright would allow NOAA to promote safety and reliability objectives by refusing product reproduction and sale rights to a publisher who does not agree to meet quality and timeliness standards established in the copyright license agreement.

Incentives for Private Vendors

NOAA also has an obligation to assure adequate dissemination of its aeronautical and nautical products. NOAA therefore wishes to utilize the marketing experience and modern production methods of private vendors when this option will provide high quality products at the lowest cost to the user.

NOAA needs copyright authority to provide incentives to outside vendors to produce and distribute low cost products of high quality. At present, NOAA-licensed vendors cannot assert copyright in NOAA-produced products or in that portion of the vendor's product produced by NOAA and in the public domain. Vendors therefore have no assurance that their investments will be secure against non-licensed competitors.

Copyright would enable NOAA to limit the market to licensed vendors, thereby encouraging private investment while furthering NOAA's public dissemination objectives. NOAA would use licensing to maintain as much competition as possible among vendors of high-quality, reasonably-priced products. Nonexclusive licensing would be used in markets which can sustain several qualified vendors in a commercially viable fashion.

Quality, R&D. All Line Offices have reviewed drafts of plan sections on Weather Services R&D and Satellite Technology R&D. A draft of a plan section on Marine Resources R&D is expected to be completed in a few weeks.

b. We have initiated efforts on several fronts to improve communication and transfer of our research results.

- We are responding to the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480). The purpose of the Act is to insure that technologies resulting from Federal research and development are made available to state and local governments, and to the private sector. We have conducted a pilot survey of NOAA's R&D activities to identify projects that may produce transferable results. The results of the survey were then included in a biennial report submitted to the Department of Commerce detailing NOAA's response to P.L. 96-480. The biennial report, mandated by the Act, is the first completed in the Federal government.

- We are broadening, within NOAA, the scope of our Marine Advisory Service. The program disseminates knowledge on the use and development of Ocean and Great Lakes resources to industry, governmental and educational institutions, and the general public. Emphasis is on being responsive to user needs and cooperation among existing agencies, programs and institutions.

- We are evaluating the creation of a network of regional Ocean Service Centers and a complimentary NOAA Extension Service. These mechanisms would enhance NOAA's responsiveness to those who use its ocean services.

II. Research and Development Funding Levels for FY 1984

Question #1

a. What is your estimate of the size of proposed R&D cuts in the FY 1984 budget proposals?

b. Why did R&D assume such a disproportionately large share of the burden of cuts in FY 1984?

Answer

1(a). We estimate that $142 million of NOAA's FY 1984 budget request involves R&D. This represents a decline of about $72 million, or 34% from a FY 1984 R&D base funding level of about $124 million.

1(b). The reduced level of funding for R&D activities should not be misconstrued as an indication that NOAA places a low priority on R&D. Quite the contrary, NOAA recognizes that a viable program of R&D is essential to sustaining and enhancing the quality of its services.

To this end, NOAA is proposing three R&D budget initiatives for FY 1984, totalling $4,508K. Morever, a significant portion (approximately two-thirds) of these R&D cuts cna be attributed to reductions in programs and activities that benefit primarily local or regional interests. For example, the Sea Grant program reduction alone accounts for $35 million of the $72 million total reduction. The beneficiaries of these activities should rightly bear their costs.

Question #2

You are proposing to cut NOAA's budget for international projects, which includes funding for the Global Atmospheric Research Project, the World Climate Program, and the Great Lakes Laboratory, from $9 million to $3 million.

a. Why did international science assume such a large share of the proposed budget cuts in FY 1984?

b. Your budget documents express the hope that other nations may increase their support for these international activities. Do you have any evidence that this will indeed be the case?

Answer

a. International programs were not targeted for reduction per se but were considered as a part of the overall NOAA program. For example, the GARP/FGGE-program was assessed in the context of NOAA's overall weather observation and prediction program. We judged that the funding could be reduced and the timeframe for analyzing FGGE data stretched out while still accomplishing program objectives. The World Climate Research Program was assessed as part of NOAA's overall climate research program. Since the World Climate Research Program is just beginning, we believe that the program level can be reduced. Specific program requests for projects under the World Climate Research Program will be evaluated as they are defined by the international community. Likewise, the Great Lakes research was assessed in light of overall needs in marine pollution and decision to reduce support for regionally specific programs.

b. We know that most of the nations involved with joint science projects have a strong interest in the continuation of those projects. A specific example is the Arctic Ice Buoy project which has evolved from FGGE and has relevance to weather forecasting and climate. After the FGGE observing year NOAA, the National Science Foundation (NSF), and the Office of Naval Research (ONR) have supported the program. NOAA has been able to negotiate with the weather services of Norway and Canada and with two large oil companies to continue this program, with continued assistance from ONR and NSF, and to share the data with NOAA.

Question #3

The FY 1984 budget request would reduce the level of funding to universities by $37,595,000. The existing ratio of university funding to in-house research funding is 45%, but would fall to 20% under the FY 1984 proposal. Does the FY 1984 proposal represent a reversal of the previous NOAA policy of increasing university-sponsored research relative to in-house research?

Answer

The proposed reduction in the level of funding to universities does not represent a reversal of previous NOAA policy. Over $33 million of the decrease in funding for universities represents phasing out of the Sea Grant program. It is the Administration's position that the Sea Grant program has successfully established a network of university and private sector activities which should now be capable of continuing without Federal support. In-house research also ~~is being~~ reduced consistent with overall priority.

III. Circular A-76

Question #1

Associate Administrator Jim Winchester has indicated that nearly one-half of all NOAA positions are being examined for transfer to contract operations under the OMB Circular A-76 review process.

a. What activities have so far been scheduled for cost comparison?

b. What is the status of NOAA's A-76 review?

c. Will NOAA hold off implementing the results of these studies until all reviews are completed, or will implementation be piece-meal?

d. What effect will A-76 have on FY 1985 NOAA personnel levels? Have you factored A-76 reductions into your preliminary FY 1985 planning?

Answer

On March 15, 1983, NOAA published in the Federal Register the list of A-76 reviews to be initiated at the present time. A copy of this notice is attached. Most of the reviews will begin in May, 1983, and will take an average of one year to complete. Implementation of the studies be phased to insure that our administrative support systems are not overloaded. Current studies involve approximately 2,200 FTE. This is nowhere near half of the approximately 14,000 FTE with which NOAA currently operates. We have no way of knowing the results of cost comparisons, therefore, specific planning for the impact of the reviews on NOAA personnel levels is impossible. However, due to the results of previous studies in the government, we do expect a sizeable number of the reviews will result in conversion of operations to contract.

Question #2

The strength of an agency like NOAA lies in its critical mass of dedicated scientific and technical personnel. Does the A-76 procedure consider such factors as the loss of interactions between scientific and technical personnel or the loss of special expertise that may have taken years to acquire?

Answer

The concerns expressed with regard to scientific and technical personnel have been considered and will continue to be considered as the studies progress.

Question #3

In 1982, former NOAA Associate Administrator George Benton testified on the subject of contracting of weather observations to private firms:

> "What happens to quality control when observations are turned over to commercial firms with no long-term professional commitment to meteorology? What are the costs of contract negotiation and renegotiation? How are the problems of equipment maintenance going to be managed? Are the "savings" overestimated when these factors are considered?"

Please comment.

Answer

Quality control of observations from contract stations is handled in the same manner as quality control for stations staffed by National Weather Service personnel. Station records are checked and station visitations (inspections) are conducted routinely. In addition, contracts contain incentive clauses to motivate the contractor to provide observations of good quality.

It is difficult to put an exact dollar value on the contract negotiation process. We proceeded slowly on the first contract with a lot of review by technical and legal experts and contract personnel. Subsequent contracts were obtained much more quickly.

Except for two locations, equipment is maintained by NWS electronic technicians who service other NWS equipment in the general area of the contract station.

Savings are computed only on the basis of the portion of the observing function that deals with taking, recording and transmitting the observations. Maintenance and quality control functions are not included in computing "savings."

Question #4

Several years ago, NOAA conducted an A-76 review of maintenance operations for the NOAA Weather Radio consoles. The review showed that the maintenance services performed by AMPRO Corp. were not as cost-effective as doing the maintenance in-house.

a. In light of the AMPRO experience, why does the current list of A-76 activities only include activities that are being considered for contracting out?

b. Does NOAA plan to look at activities that are presently under contract, to see if they could be done in-house more effectively?

c. If not, doesn't NOAA's approach reflect a clear bias toward contracting out, rather than an unbiased look at the most cost-effective way to perform a service?

Answer

The list of studies concerns only currently in-house activities. However, in accordance with the Circular, NOAA will make a review every five years of those activities which are performed on contract to see if the cost is still reasonable. Of course, at any time when performance becomes unacceptable, we will take appropriate action as we did in the AMPRO case. NOAA has a totally unbiased view as far as whether the function is performed in-house or on contract. Our primary concern is to insure that we have the most cost-effective operation to meet NOAA's needs.

IV. Funding and Personnel Levels for the NWS

Question #1

The FY 1984 budget request for the National Weather Service proposes the reduction of 242 personnel, nearly all of them meterologists and meteorological technicians, which would leave the Weather Service with its lowest personnel levels since the 1960s. Please provide a table showing NWS personnel levels each year for the past 15 years, including the FY 1984 proposal. How will you provide the levels of services that the Congress and the public expect after laying off 240 meteorologists?

Answer

The table containing a history of NWS personnel levels is attached.

To achieve this reduction in Federal expenditures, we will economize in weather office operations and reduce the levels of some non-core weather services. The National Weather Service's basic core functions of providing general public weather forecasts, issuing weather related warnings for the protection of life and property, and collecting and analyzing meteorological data will not be affected by these reductions.

We presently use a mix of regular-time and overtime work to ensure uninterrupted weather office operation during periods of temporary staff shortages due to leave, training, etc. We can operate those offices more economically with no significant impact on essential forecast and warning functions by reducing personnel and using increased overtime to maintain essential operations.

The National Weather Service provides many weather services which are not directly related to its basic core functions. Federal savings are possible for the National Weather Service reduces the level of its non-core services. The users of the non-core services can obtain them through self-help programs or private meteorological services.

Question #2

In your testimony, you refer to a preliminary plan for the future organization of the National Weather Service.

a. Please outline that plan for us here.

b. When do you anticipate beginning implementation of this plan?

Answer

The Weather Service has been working for several years on a plan which would include the introduction of new technology and organizational changes to make effective use of this new technology. The technology part of the plan includes new Doppler radars (NEXRAD), automation of surface observations, and improved communication and data processing systems (SYSTEM II).

Work on these areas is already underway. The organizational part of the plan is still being developed with the assistance of Booz-Allen and Hamilton, Inc. The Booz-Allen study is expected to be completed during the summer of 1983, at which time a more comprehensive look at organizational changes can be undertaken.

Question #3

We have repeatedly heard from witnesses testifying before the Committee and have read in a Special Report to the President and the Congress ["The Future Of the Nation's Weather Services, July 1982 (NACOA)] that public safety and economic efficiency could be greatly enhanced by the installation of new technology in the National Weather Service.

a. What are the long-term plans for the development and deployment of new technologies such as observation, communication, display, and data processing technology, automated weather stations and improved capacities in local ("mesoscale") weather?

Answer

It is widely recognized that recent and anticipated advances in science and technology provide a basis for improved weather services. In particular, they make it possible to: (1) obsserve, detect, analyze, and model severe and hazardous weather phenomena whose dangerous winds, heavy rain or snow and flooding are commonly associated with smaller scales and shorter lifetimes; (2) obtain routine global observations of the atmosphere and oceans and make useful conventional forecasts for a week or more and more general forecasts for months or seasons; (3) organize, prepare, and disseminate to users weather data and information in needed amounts and forms, and especially to deliver urgent warnings in time to save lives and property; and (4) accomplish current service functions and introduce the improvements in productivity resulting from automation and better support of human capabilities.

Early steps of the long-term plan are already well underway and/or included in the President's budget proposals. The NEXRAD program will introduce significant improvements in the nation's weather radar network for the detection and quantitative observation of storms and precipitation. The GOES satellites and their Atmospheric Sounders (VAS) will provide frequent, detailed observations of vertical atmospheric struture (related to storm development) and moisture patterns, as well as the motions of clouds and other features. The ground-based, remote sensing profilers provide continuous, unattended vertical profiles of wind that are superior in quality to those available from current operational systems, as well as temperature and humidity profiles comparable to those critical data available almost continuously and with improved consistency. At the same time, they will free up valuable staff time, especially during bad and changing weather when it is most needed. Weather and hydrological instruments also are being deployed in remote and inaccessible areas where they report automatically via satellite collection systems.

At the same time, observing systems are extending over and into the oceans. Buoy systems observe meteorological and oceanographic condictions around the U.S. coasts, and the capability and reliability is steadily improving. Simple drifting buoys can provide observation from mid-oceans. Systems have been developed that report observations automatically from commercial ships and aircraft, as well as oil platforms. We plan increased use of such systems.

Further improvements in the NOAA polar orbiting satellite system and GOES geostationary satellites are planned when those in the procurement pipeline must be replaced. The concept of profiles has been demonstrated on the ground, and we plan to move toward demonstration on an aircraft. This technology holds the promise of providing global wind soundings from satellite in the next decade (WINDSAT concept).

While observations are valuable to many users in their own right, they are only the starting point for the most important weather service products. The collection, distribution, analyses and interpretation of weather data already have been revolutionized by technology, and another revolution is underway. Weather Services are essentially information services, and information processing and communication technologies are blossoming in capability, becoming more economical and being introduced rapidly and broadly in business, government and the society at large.

NOAA has long used giant computers to process and analyze weather data and to make objective forecasts of meteorological fields for periods of 12 hours to several days for North America, the Northern Hemisphere and the globe. The resulting analyses and forecasts serve as guidance for weather forecasts of all types of NWS offices across the nation, private weather services, and many nations of the world. The quality and timeliness of the guidance products is largely limited by the available computer power. We plan to upgrade the current, decade-old computers with modern, much faster technology.

The National Severe Storms Forecast Center (NSSFC) provides guidance related to much smaller, faster developing weather events. They have had to rely more heavily on human analysis, insight and experience, and on fragmentary and often delayed information from diverse sources including volunteer spotters as well as radars and satellite images. In cooperation with NASA, the Centralized Storm Information System, based on creative development efforts by the University of Wisconsin, was introduced into NSSFC to provide fast and convenient access to all data types and computer assistance in analysis, display and interpretation. This program has established the value and the technical basis for upgrading the operational systems. We plan a phased introduction of this technology to support the human-interactive functions at NSSFC, the National Hurricane Center and the National Meteorological Center during the latter half of this decade.

The great majority of weather service products originate at NWS field offices. Locally-available data and knowledge are crucial to warnings and action-oriented advisories. The NWS has given high priority to adopting technology to support field operations functions. The Automation of Field Operations and Services (AFOS) program was a pioneering step in this direction, and important enhancements to that system are planned.

The AFOS system was not designed to support satellite or radar imagery, which are central to improved mesoscale services and warnings. As an interim step, the Satellite Weather Information System (SWIS) will introduce at Forecast Offices the capability to display satellite imagery on color CRT's in time-laspe (movie) format, and to overlay other meteorological graphics products available on AFOS.

From a longer-term perspective, the powerful interactive capabilities used in CSIS are equally applicable to field offices. As the cost of this technology falls, it should be feasible to introduce it there. In preparation for this, the Prototype Regional Observation and Forecasting Service (PROFS) program was established to define the appropriate technologies and techniques for future services. We plan to incorporate selected new capabilities, such as digital satellite and radar processing and display, use of time-continuous surface and profiler data, and interactive interpretation in the field office information system that succeeds AFOS near the end of the decade.

Of course, all of the functions discussed previously depend on rapid, reliable communications. Furthermore, the wide use of high-resolution imagery dramatically increases the volume of information to be distributed. Fortunately, the rapid development of communications technology, including satellites, fiber optics, and digital techniques, can easily support the requirements. A comprehensive program that includes the field office information system and supporting communications capability is in the planning stage.

In the end, weather information must reach the users. Cable TV, Teletext, Viewdata, and similar technologies are revolutionizing the way people get information, and the amount they can receive (and will want). We plan to develop the capability to provide access to NWS-produced weather information for dissemination by commercial media using modern technologies.

Finally, the evolution of improved service capabilities, for mesoscale weather particularly, rests on concurrent research and development activities in the broad national community. This community is pulling together, for example in proposing a national STORM program, to address these needs in a cooperative framework.

Question 3(b)

How do your long-term plans for development of new technologies fit into short-term appropriation cycles?

Answer

It is obvious that capital investments will be required to introduce new technologies. We are examining a number of alternatives, including lease-purchase concepts, as well as conventional budget initiatives.

Question #4

We are pleased to note that you are requesting an additional $5.7 million for planning replacement of outmoded radar system. When do you plan to begin, and to complete, installation of the NEXRAD system? What is your best estimate for the total number and cost of radar units in the NEXRAD program?

Answer

The timetable for installation of the NEXRAD systdem depends on the level of resources available during the development (validation) phase. Under the current plan, installation of the first operational unit is scheduled for early 1988 and the program is expected to extend through 1992.

The number of radar units in the tri-agency NEXRAD program is nominally 160 systems. The final cost will depend on the conclusions of a study to assess the costs and benefits of a final network comprising a mix of Doppler and non-Doppler radar systems (see answer to following question) and on the resources available for the production phase of the program.

Production costs for the NEXRAD system depend on a number of factors. Principal among those factors are the following:

1. Which of the two competing contractors is finally selected for limited and full scale production;
2. The number of Doppler units produced and whether the selected contractor is awarded a contract for the full production run or only a one year purchase;
3. The extent to which competition is retained in the program until firm fixed price proposals for the production phase are in hand; and
4. The time frame over which the production phase is conducted and particularly the start date of the production effort. A one year delay in the start of the production effort is estimated to add approximately $45-50 million to total program costs.

Noting these factors, the current preliminary estimates of unit production cost range from $2 to $3 million. This estimate includes installation, checkout and all supporting functions with the exception of training, follow-on spares and any expansion modules and is expressed in constant FY 1983 dollars, i.e. excluding effects of inflation.

Question #5

The new radar system will contain some Doppler radars, which offer increase lead-time in the detection of severe weather including tornadoes. Will the NEXRAD system combine Doppler and non-Doppler radars? Do significant problems still exist with operational use of Doppler radars?

Answer

The use of non-Doppler and Doppler radars in the NEXRAD system is a complex issue. Non-Doppler radar, even with additional automated signal processing to correspond to planned NEXRAD capabilities, has a lower acquisition cost than the Doppler system. Frequency of occurrence of severe weather and population density do vary from region to region. It cannot, however, be assumed that a mixed system tailored to the estimated risk level will have a lower cost than an all Doppler system over the operating life of the system.

Additional costs of development, providing operations and maintenance training, documentation and logistics support for two very different radars may well exceed the savings realized in initial acquisition cost.

For these reasons, a decision has not yet been reached on the mixed Doppler/non-Doppler question. A study is currently being made to assess the relative costs of the two approaches. Final conclusions of the study will be available in the summer of 1983.

Doppler radars are more complex than non-Doppler radars. The NEXRAD system will provide a higher level of automation in the generation and display of weather data products, including many products and capabilities that will be new and unfamiliar to radar operators and meteorologists. For these reasons, operation of Doppler radar will be different and require appropriate training, but significant special problems are not anticipated.

Question #6

In FY 1983, the Administration proposed funding the NOAA Aviation Weather Program through the Airport and Airway Trust Fund. However, the FY 1983 continuing resolution did not provide for the transfer of the $27 million needed to continue this program. How is NOAA currently funding its Aviation Weather Program? How do you proposed to fund this program during FY 1984?

Answer

Although the FY 1983 Continuing Resolution provided no funds for the Aviation Weather Program, it did direct NOAA to continue to provide the services to the FAA at the budgeted level of activities. NOAA has been providing these services as directed from the overall allocation of Weather Service funds until resolution of the method of funding is achieved. DOC/NOAA is in the process of recommending to OMB a permanent funding mechanism for Aviation Weather Services.

Question #7

Once again in FY 1984, your are proposing to eliminate agricultural weather services. In testimony before this Committee last year, witnesses showed that this program has proven to be at an annual cost of less than $1.5 million, a very cost-efficient Federal investment.

a. What is your justification for eliminating a program with a small annual budget, yet which provides farmers in over 40 states with necessary weather data and forecasts to increase their productivity?

b. Have any cost-benefits analyses been conducted on this program to showing that it is not a worthwhile investment of $1.5 million per year?

Answer

There have been several independent studies indicating the value of agricultural weather information to farming. It is not a question of the value of these services; rather, it is a matter of who pays. This is a specialized service to a specialized user who profits from the application of this service. In this era of strict Federal economy, it is appropriate that the agricultural community pay for this service rather than the general taxpayer. NOAA will continue to provide general weather service, public weather warnings and forecasts, and will continue to make them available for use by the agricultural community. As a result of NOAA terminating this service, it will be necessary for agricultural interests to make arrangements for private sector meteorologists to provide the necessary specialized forecasts and advisories that are used by farmers in making crop and site-specific decisions such as planting, cultivating, irrigating, harvesting, etc.

V. Ocean Pollution Research/Great Lakes Research

Question #1

a. In view of what seems to be increasing need for good information on ocean pollution, how can you justify cutting this program by 55%?

b. What is NOAA's role in ocean pollution research?

c. Do you feel that your program has been too strongly oriented toward basic research, and not enough toward management needs?

Answer

a. Most of the research carried out by NOAA's marine pollution research programs has been directed toward fundamental understanding of oceanic processes and the mechanisms of pollutant effects on marine ecosystems, i.e., basic research. While some of this research could produce benefits in the long-run, it is expensive and produces few short-run benefits. We plan to redirect our marine pollution research programs toward the current needs of ocean resource managers. This program redirection implies a focusing of NOAA's limited dollars and manpower on problems of national importance, such as ocean waste disposal. It will also include a new focus on national assessments, rather than site-specific issues, and on the synthesis of available information for decision-making purposes. We think we can effectively implement this redirection with fewer resources than had been available to NOAA's marine pollution programs in the past.

b. As the principal Federal marine science agency, NOAA's role in ocean pollution research is to provide that best available scientific data and assessment services that support management decisions leading to balanced use of the Nation's coastal and ocean resources.

c. Yes. To serve the needs of environmental management most effectively, there should be a stronger and more direct link between the research program and the design and planning of the management approach itself. NOAA's research program has been oriented toward fundamental ocean processes and pollutant impacts emphasizing a number of different regional or site-specific objectives. Although this information has been useful for the identification and evaluation of specific marine pollution problems, the program has not been systematically oriented toward the comparison of management alternatives.

In effect, we are proposing to shift our program design from the broad objectives implied by question (a) below to the stronger management orientation of question (b).

(a) What do we need to know about ocean processes and pollutant behavior to measure/preduct the potential distributions, movements, retention, and effects of pollutants in marine systems?

VS

(b) What do we need to know about pollutant sources, discharges, ocean processes, pollutant behavior, and effects to select the best available approach for the effective management of those pollutants?

Question #2

In 1981, a New York District Court ruled that EPA could not prevent New York City from ocean-dumping sewage sludge until the agency showed that ocean dumping was a poorer option than incineration of landfill-disposal. In the meantime, EPA has been looking at disposal of sewage sludge at a site 106 miles offshore.

a. What is the status of the proposal to use the 106-mile site?

b. What do we know about the potential effects of ocean dumping at the 106-mile site vs. the 12-mile site currently being used for disposal?

c. Don't the proposed cuts in R&D compromise the effectiveness of EPA's efforts to manage the environment?

Answer

a. Through a December 1982 notice in the Federal Register, EPA proposed to designate the 106-mile site as an approved dumping site for municipal sewage treatment sludges. Separate notices on the same day indicated that EPA would consider petitions to redesignate the 12-mile site and the never used, alternative 60-mile site for sewage sludge dumping. If only the 106-mile site is designated, sewage slude will be dumped there. If the shallower sites are also designated, the future ocean disposal of sludge will remain unresolved. We do not expect sewage sludge to be dumped at the 106-mile site before 1984, at the earliest.

b. Sludge dumping at the 12-mile site has contributed to: (1) physically altered sediment texture, highly organic sediments, chemical contamination of sediments and a degraded benthic community in the Christiansen Basin of the New York Bight; (2) pathogen input to the New York Bight Apex which has led to a long-standing ban on shellfishing over the entire Apex; and (3) chemical contamination of commercially valuable fishes. If sewage sludge were the sole contaminant source to the Bight, those detrimental effects could be eliminated by dumping sludge elsewhere.

Projections have been made on the oceanic distribution of sludge if the quantity now dumped at the 12-mile site were dumped at the 106-mile site. The flow of water available for diluting sludge is very large at the 106-mile site so water column concentrations are unlikely to reach levels that would affect or contaminate planktonic organisms or pelagic fish. If sludge were dumped slowly to achieve high initial dilutions and to minimize coagulation among sludge particles, the settleable solids are projected to be so diluted by the time particles reach the seafloor that sediments would not be physically altered and would not present a chemical hazard to benthic organisms. Pathogen accumulation by sessile benthic animals is possible, but such contamination poses no known hazard to marine organisms. No commercial shellfish would be affected.

Because flow at the 106-mile site is not uniform in velocity or direction (a fact which enhances dispersion), some sludge dumped at the site will migrate westward over the outer continental shelf. However, particles reaching the shelf would have to sink very slowly or they would have left westward-moving surface water before it reached the shelf. Water and sludge which will reach the outer shelf will be dispersed over a large area (as opposed to dumping over the shelf). So, although sediment contamination on the outer continental shelf will occur in principle, dispersion should be great enough to avoid any chemical or pathogenic devaluation of living marine resources.

The 106-mile site differs from the 12-mile site mainly in not lying within a commercial fishery and being more highly dispersive. The environmental effects of ocean dumping at the 106-mile site will be less significant than at the 12-mile site. If sludge were to be dumped at the 106-mile site, it would be possible to test the projections of its oceanic distribution and effects.

c. NOAA's reorientation of ocean pollution research is expected to strengthen the cost-effectiveness of the program for ocean resources management purposes.

Question #3

Given the decision by the New York District Court regarding New York City's sewage sludge, do you anticipate that usage of ocean dumpsites will increase in the future? If so, why are you proposing to eliminate all monitoring of ocean dumpsites in the FY 1984 budget?

Answer

We expect ocean dumping of sludge to continue to increase in the future and we expect that areas other than Northeast municipalities will propose the ocean disposal of sewage sludge. Monitoring should also continue. Oceanographic sampling or monitoring in the context of municipal waste management is most useful if it leads to descriptions of previously unknown environments, is used to assess trends in marine environmental quality, or tests hypotheses on waste distributions and biological responses to waste.

The monitoring programs proposed for elimination are intensive sampling effort that document environmental conditions in unnecessary detail, sometimes without prescribed uses for the information. We expect to replace these over-intensive (and expensive) monitoring programs with others oriented toward site evaluation and/or the documentation of unanticipated, long-term effects. This approach requires intensive sampling for a short period (2-3 years) followed by low-level sampling to detect any chronic changes over long time periods. We expect these approaches to be more cost-effective than those in present use.

Question #4

Recently the Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan was reviewed and judged to be of high scientific merit. You are proposing to save $3.6 million by closing this Lab. If they have been deemed a-valuable research facility, what is the justification in closing the Lab.

Answer

The Administration's position is that the physical and ecological state of the Great Lakes are a state and regional responsibility. The quality of the research conducted by the lab is not in question.

I. Commercialization of Meteorological and Land Remote Sensing Satellites

Question #1

On March 8, 1983, the Administration announced its decision to allow private industry to purchase the government's four meteorological satellites and one land remote-sensing satellite.

This decision was based on the premise that private industry can operate these satellites on a more cost-effective basis than the government.

Have cost benefit analyses been completed which would justify the President's decision? If no such studies have been completed, on what basis was the decision made?

Answer

Definitive benefit/cost analyses must await responses to a competitive selection process. The President's decision to pursue further the subject of commercialization was made on the assumption that net long-term cost to the government to meet its needs for satellite remote sensing data might be lower under commercial ownership. The President states that there will be no sale of government assets unless prerequisites, including the provision that commercialization does not result in excessive additional costs to the government, are met.

Question #2

What will be the short-term costs to the government of this transfer? Long-term benefits?

Answer

The details on short-term costs cannot be determined until competitive bids are received. Revenues from the sale of the government's spacecraft or ground systems could result in lower net Federal expenditures immediately after commercialization. These short-term savings might be offset by greater long-term costs, however.

The long-term national benefits from promoting comercial activities in space could include: maintaining U.S. technological leadership in space at a lower cost to the taxpayer; providing present data products and services more efficiently and economically; developing products and services that are more responsive to the needs of the users; developing the nonFederal market for satellite data services; and providing greater employment and new tax revenues from a new industry.

Question #3

Please explain how this decision will affect the international community which depends on the data produced by these U.S. satellites.

Answer

The international community should not be affected by commercializing the weather satellites. The free international exchange of weather data is essential to NOAA's weather forecasting programs, as it is to those of the Department of Defense. NOAA intends to include in its list of weather satellite requirements to be met through commercialization the continued direct broadcast of data to foreign users that has characterized the government's polar orbiting and geostationary weather satellites. The global distribution of derived weather products would not be affected by commercializing the satellites themselves. The Cabinet Council on Commerce and Trade recognizes the importance to the United States of continuing past data distribution policies and endorses this NOAA plan.

Question #4

Will legislation be submitted to Congress before the bidding process is open to the private sector?

Answer

The Department of Commerce will work closely with the Congress during the competitive selection process. While some issues, policies and procedures that should be addressed in legislation have already been identified, submitting final legislation prior to evaluating responses to the competitive process is premature. We do not know with certainty all the legislated conditions that may be required to ensure successful commercialization while protecting the national interests related to national security and foreign policy, and ensuring the continuing availability of essential data.

Question #5

The President has said that bids can be made separately on the meteorological satellite and the land remote-sensing (LANDSAT) satellites. Since LANDSAT has not proven to be a money-making venture, do you expect that private industry would bid on LANDSAT alone?

Answer

We do not know if private industry will bid on Landsat alone. At least one firm has said it would do so, and there is reason to believe that others may be considering such a bid. If the government were willing to commit significantly more resources to land remote sensing from space than are now included in the budget, several firms would be expected to bid aggressively.

Question #6

Title II of P.L. 97-324 directed the Secretary of Commerce to report to the Congress by February 1, 1983, on institutional alternatives for transferring civilian satellites to the private sector. What is the status of this study?

Answer

The report was delivered to Congress in early April.

Question #7

The French intend to launch the land remote-sensing SPOT satellite in late 1984 or early 1985. The U.S. appears to be losing some of its competitive edge vis-a-vis SPOT in light of OMB's decision not to fund any additional satellites beyond the launch of LANDSAT D-prime in 1986. At what point in time, given international competition, does it become critical for the U.S. to commit its resources for the development of the next generation of land remote-sensing satellites?

Answer

It would take six or seven years from funding approval until the next generation of satellites become available for launch. Thus, if funds for a Federal program became available in Fiscal Year 1984, a new satellite could be launched in 1990 or 1991. Each year that funding is delayed results in a year's slip in the availability of a new satellite. The expected lifetime of Landsat D' is through 1987 or 1988.

Clearly Landsat's Thematic Mapper is major competition with SPOT because of Landsat's greater specrtal coverage and its capability for global acquisitions (through the Tracking and Data Relay Satellite System). The SPOT will have the competitive edge with its higher resolution and stereoscopic coverage. If the U.S. government were to undertake further competition with France (and Japan), it should proceed immediately to define the characteristics of its next-generation system. Another element of competition is assured data continuity. France plans to launch a second SPOT satellite, but there would be a data gap in U.S. data services after Landsat D' and before a next-generation satellite is launched. The U.S. could build and launch a Landsat D' to reduce or eliminate this gap.

An advantage of commercialization is that U.S. industry can move more rapidly to implement new (existing) technologies than can the government. If funds were available, a commercial operator might be able to launch a next-generation satellite system one or two years earlier than can the government. The need for an interim system to assure continuity of data, if that were determined to be in the national interest, would still remain, however.

Question #8

Given the close linkages between the civilian and military weather satellite systems, concern has been expressed about the security implications of transfer of the civilian weather satellites to to the private sector.

a. During the Cabinet Council process, what reservations did DOD or the security agencies express with regard to the transfer?

b. Are all parties convinced that these satellites may be transferred without security implications?

Answer

The Cabinet Council on Commerce and Trade was advised by DOD and the security agencies of their concerns over commercialization. It was agreed that these concerns could be resolved through a combination of new legislative authorities, contractual agreements between the government and industry, and perhaps a licensing procedure. These matters will be explored further in the preparation for the competitive selection process and drafting legislation for consideration by the Congress.

VII. Funding for Weather Satellites

In FY 1983, the Administration proposed downgrading the two polar-orbiting satellite system to a one-satellite system. The Congress ultimately rejected this request on several grounds:

- A two-satellite system probably yields better weather forecasts.
- A one-satellite system provides no back-up and renders total gaps in satellite coverage very likely.
- Many other nations (over 120) depend on polar-satellite data.

In FY 1984, the Administration is again requesting downgrading of this system.

Question #1

The Committee has repeatedly asked NOAA, and never gotten a satisfactory answer to the question: "What is the difference in the quality of weather forecasts with zero, one, or two polar-orbiting satellites?"

a. Can you answer this question? If not, why not?

b. How much would it cost to answer this question?

c. Before proposing elimination of part of the polar-orbiting system, wouldn't it be helpful to Congress (and to NOAA) to know the answer to this question?

Answer

Data from the two polar-orbiting satellites of our current configuration are used to fill data voids in the conventional observing network. Lack of data from otherwise data void areas will reduce the accuracy of the forecasts. It is not possible to quantify this reduction in accuracy other than to indicate that some forecasts will be affected because we lacked knowledge of the initial conditions upon which the forecast was based.

The two satellite system provides a global data base for input to the 00:00 and 12:00 Greenwich near real-time primary weather analyses. Reduction to a one satellite system will diminish Western Pacific long-range forecasts which rely on the global model. The one satellite system will continue to provide primary input (for the Eastern Pacific) to the limited fine mesh prediction model of the National Meteorological Center. This model provides the primary short range forecasts for the continental Untied States.

Question #2

Have you explored other options for maintaining the two-satellite system without increased appropriations, such as international cost-sharing or new sensor development?

a. What is the status of negotiations with our European allies regarding sharing the costs of polar-orbiting satellites?

Answer

In May 1982, representatives from Canada, the European Space Agency, France, India, Japan and the U.S. (NOAA) met to discuss long-term plans for national remote sensing satellite systems and areas for possible cooperation. During this meeting, the U.S. proposed that consideration be given to developing an internationally supported polar-orbiting meteorological satellite to maintain a two-satellite system. All countries involved endorsed the need for the second satellite and acknowledged that some form of international support and cooperation would be desired.

Discussions concerning this proposal have continued as part of follow-up activities to the Versailles Economic Summit. A working group was established to review existing international cooperation in science and technology including satellite remote sensing. The working group, consisting of representatives from Canada, the Federal Republic of Germany, France, Italy, Japan, the U.S., the United Kingdom, and the European Communities, is considering this among other remote sensing proposals. It is hoped that the summit can add impetus to actions that would leap to an international polar-orbiting weather satellite.

Question #3

Last year, in testimony before the Natural Resources Subcommittee, Dr. Verner Suomi stated that it may be possible one day to install microwave sounding capability on geosynchronous satellite and that we should retain two polar-orbiting weather satellites until the microwave capability can be added to the geosynchronous satellites.

Answer

We are aware of Dr. Soumi's ideas and would very much like to implement a microwave sounder on our GOES satellites. The GOES satellites primarily support our responsibilities for severe weather forecasts and warnings (severe thunderstorms, tornadoes, hurricanes, etc.) A high resolution instrument operating at microwave frequencies offers the distinct advantage of being able to obtain data in the presence of clouds. Clouds limit the operation of our present infrared sounding instruments.

To implement soundings by a microwave instrument from the geostationary altitude of 23,000 miles (36,000 km) with a ground resolving ability of around 19 miles (30 km) requires an antenna of some 14 feet (4.4 m) in diameter. It is a large technological challenge to construct an antenna of this size that can be collapsed for launch, then deployed once on orbit. We are following closely the research and development work of NASA involving the design and construction of large antennas for use in geostationary orbit (for communications applications.) In our opinion, considerable development work is needed to prove this technology. Once it is ready, NOAA will propose its application to a microwave sounder. We do not see the technology being ready until some time in the 1990's.

The polar-orbiting weather satellites are used primarily for gathering data over the entire globe. The lower altitude of the polar-orbit (530 miles, 850 Km) makes the construction of the antenna much simpler and well within the state-of-the-art. The microwave sounder presently on the two polar weather satellites does provide observations over the area covered by the GOES satellites four times a day. A microwave sounder on the GOES could provide observations over the United States and adjacent oceans as often as once each half-hour and more often over smaller areas threatened by severe weather. Dr. Suomi's remarks may be expressing his opinion that it is preferable to obtain microwave soundings four times a day from two polar-orbiting weather satellites until we can develop (and afford) the technology needed to accomplish microwave sounding from geostationary altitude.

Question #4

In late 1982, the Pacific geostationary satellite (GOES-West) "died".

a. What are the current plans for replacing this satellite?

b. Does the death of GOES-West leave us without a back-up goestationary satellite?

c. Should you reconsider your decision to cancel one of the polar-orbiting satellites in light of the deat of GOES-West?

d. What are the negative effects of a combines downgrading of the polar-orbiting system and the death of GOES-West?

Answer

a. The GOES F satellite is planned to replace GOES 4 which failed in 1982. The satellite is currently at the Kennedy Space Center being prepared for launch on April 28, 1983. The satellite is planned to be in place, checked out, and ready for full scale operations within a month following launch.

b. The GOES program has been based on a procurement approach that accepts a moderate degree of risk. A low risk, conservative would require that we maintain two operational satellites and a spare in-orbit, with a fourth satellite ready for call-up in the event of in-orbit failure. We have taken the approach that two operational satellites should be maintained in-orbit and that a third should be launched as appropriate during the nominal life expectancy of the operational satellites. If practical the launch of this third satellite would be accelerated following premature in-orbit failure. This plan is reasonable if one considers that the most essential data for contiguous United States can be obtained from the single (remaining) GOES, prior to replacement of a failed satellite.

It is sometimes possible to use partially failed satellites to bridge the period between premature failure and launch of a replacement satellite. When GOES-4 (West) failed, the GOES-1 satellite was returned to service and was able to provide limited visible channel imagery which, in combination with the polar satellites, provides marginally acceptable monitoring of weather conditions over the eastern Pacific. The launch of GOES F will restore the two satellite geostationary system to full operation. No additional satellites will be available for launch before early 1986. Premature failure of GOES 5 or GOES F (to be renamed GOES 6 after launch) may cause us to institute single satellite coverage until that time.

c. & d. The premature failure of GOES-West significantly affected our ability to monitor weather conditions over the eastern Pacific. GOES-1 has provided limited daylight coverage which has partially filled the data void. The polar-orbiters NOAA 6 and NOAA 7, which are still operational, have combined to provide twice nightly coverage of the area and have supplemented the GOES-1 limited coverage. Forecast accuracy, though somewhat diminished, has not suffered seriously since major overnight changes have been seen in the polar satellite data.

Had we been limited to a single polar satellite during this period, forecast accuracy would likely have been reduced somewhat further, though the extent of this degradation is impossible to estimate.

The decision to convert to a single polar satellite has not been changed as a result of the GOES failure. We fully expect future GOES satellites will meet their design goals, assuring continuity of dataa from East and West satellites.

Question #5

As part of the current budget request, you have also requested that NOAA be permitted $38 million in funds previously appropriated for the polar-orbiting satellite program.

a. What is the status of this reprogramming request?

b. Will you await approval from the Appropriations Committees before proceeding with the reprogramming?

c. Let us assume that Congress disapproves the downgrading of the orbiting satellite system. How soon would funds have to be provided to satellite contractors to guarantee continuity of the two polar-satellite systems?

Answer

a. This reprogramming request has been turned down by the House and the Senate. The request has been withdrawn by NOAA.

b. This question on waiting further Appropriations Committee action is not now applicable. Reprogramming of the $38 million is no longer being proposed by NOAA.

c. The proposal from RCA is valid until July 1, 1983. The contract is for NOAA H and I with an option for J. This option must be exercised to assure continuation of a two polar configuration. With restoration of the $38 million we can now continue with the necessary negotiations. Final decision to exercise the J option is contingent on FY 1984 congressional action.

VIII. LANDSAT Services

The recently launched Landsat-4 earth remote-sensing satellite carried with it a multispectral scanner (MSS) as well as a finer resolution Thematic Mapper (TM). Recently, the communication link carrying TM data failed, which means that: 1) the U.S. will not be receiving TM data until the Tracking and Data Relay Satellite System (TDRSS) is launched late in 1983; and 20 foreign ground stations will not receive TM data until Landsat-D prime is launched in 1985-1986.

Question #1

When do you expect that TM data will again be available? How much of the globe will be "sensed" using the TDRSS, and how much will be "blacked out"?

Answer

With the launch of the TDRS I on April 4, 1983, some data from the TM sensor can be obtained during the period of April 20-29. Limited routine access to TDRS will begin as early as May 19, 1983. TDRS I will view all land areas except Asia and Australia. TDRS II, to be launched in August and available for limited access in October, will complete the global coverage except for a small strip over the Indian subcontinent.

Question #2

What caused the failure of the TM communications link? Is this failure likely to erode user confidence in the U.S. Landsat system?

Answer

The most likely cause of the X-band transmitter failure is the failure of a radio frequency power transistor in the frequency source amplifier component of that system. User confidence is not likely to erode since TM data will be forthcoming through the TDRS communications link.

Question #3

NOAA's FY 1984 budget request for LANDSAT assumes collection of significant user fees for LANDSAT data. How will the failure of the TM communications link affect NOAA's ability to generate user fees from LANDSAT, both in FY 1984 and in later years?

Answer

TM data will be available through TDRS and MSS data will also be available for sale. There should be no affect on NOAA's ability to generate domestic user fees in FY 1984 and to the X-band failure.

Question #4

Several foreign ground stations installed special equipment to receive TM data.

a. Has the failure of the TM affected our ability to recover revenues from these stations?

b. What has been the reaction to these stations to failure of the communications link?

c. Will this failure affect the attempts by the People's Republic of China to purchase a LANDSAT ground station?

Answer

a. No. There are two sources of revenue from foreign ground stations. There is a fee for access to the LANDSAT satellite which is independent of sensor data, and a product distribution fee from products sold. We expect to replace the TM data that would have been acquired through the X-band transmitter by data acquired by the U.S. via TDRS and then shipped to the foreign ground station for processing and sale.

b. The stations expressed concern and also a willingness to cooperate in the establishment of the alternative data link referred to in (a).

c. No.

Question #5

In FY 1983 the Administration attempted to spread the costs of operating LANDSAT more equitably among agencies using the system. However, the FY 1983 appropriations for LANDSAT for the Department of Agriculture (USDA) were less than requested by the Administration.

a. Did this shortfall from the Department of Agriculture affect operations in FY 1983?

b. What is the outlook for FY 1984?

Answer

a. In Fy 1983, the USDA was appropriated $3.7 million of its requested $7.4 million needed to fully support its programmatic data needs. In addition, NOAA was able to reduce its operating budget by negotiating an operation and maintenance contract below its estimate. These two events still leave NOAA's operating budget short by approximately $1 million. NOAA has asked the USDA to go forward with a supplemental request of $1 million to enable USDA to purchase addtionaal data needed to fully execute their program. Failure to obtain this $1 million could mean that NOAA would run out of money to operate the system some time in the fourth quarter of FY 1983.

b. NOAA's FY 1984 budget estimates LANDSAT operations funding requirements at $39.536 million with $16.0 million of the total being funded by reimbursement from Federal agencies. NOAA's original estimate of USDA needs was $10.0 million. USDA estimates their needs at $7.7 million. NOAA is reviewing its budget and operating expenses to determine if it can meet its mission at the reduced funding level.

IX. Need for an Ocean Satellite System

Improved ocean observations have proved possible with the use of satellites. Despite enhanced weather forecasts, improved services to marine transportation, fishing, offshore energy development, and a better understanding of oceanic processes, there are currently no plans to develop an ocean satellite system. In FY 1981, a joint NASA/NOAA/DoD effort to initiate a National Ocean Satellite System was proposed.

Question #1

A recent report from the National Advisory Committee on Oceans and Atmosphere criticized the cancellation of the NOSS System.

a. What has been the response of NOAA and other Federal agencies to NACOA's recommendations?

b. What are the current and projected plans for developing a multi-agency National Ocean Satellite System?

Answer

a. I cannot speak to the response of other Federal agencies to NACOA's recommendations. NOAA supports the Administration's position that the NOSS system was too expensive to implement given the importance of other priorities for the nation.

b. NOAA is cooperating in the planning for the following multi-agency efforts in ocean remote-sensing (all to be FY 1985 funding proposals to the Department of Commerce):

With NASA: Planning for the development of an Ocean Color Instrument (OCI) to fly on the next generation polar-orbiting weather satellites (circa 1990). NASA would develop the prototype instrument, and NOAA would purchase follow-on instruments for operational use.

With DoD and NASA: Planning for the fund sharing and for the data use from the Navy Remote Ocean Sensing System (NROSS). Under current plans, NOAA and NASA will request funds in FY 1985 to participate in this Navy ocean satellite program. The funds will be for a share of the space system cost and for the data acquisition, processing, and distribution systems needed to conduct applications research.

With DoD: Planning to acquire and develop applications of data from DoD's GEOSAT (late 1984 launch). The altemeter data from this satellite will be used to develop global information on ocean winds, waves, and circulation.

Question #2

a. What kinds of ocean data are currently being obtained from operational meteorological satellites?

b. Are there plans to incorporate other kinds of newly developed ocean sensors on meteorological satellites which are scheduled to be launched?

c. What are the technical problems of using ocean sensors weather satellites as an interim measure?

Answer

a. Please refer to the attached table for current operational ocean data products.

b. As mentioned in the answer to Question 1(b), NOAA is planning to cooperate with NASA in the development of an Ocean Color Instrument for the next generation, polar-orbiting meteorological satellites (NOAA-NEXT). In additionl, the Advanced Microwave Sounding Unit (AMSU) also being proposed for NOAA-NEXT will provide improved sea-surface temperature measurements in cloudy regions, oceanic precipitation estimates, and high resolution imagery of ice features.

c. The technical problems of adding ocean sensors to the present weather satellites are the physical limitations of power, weight, and room on the spacecraft. The present complement of weather instruments completely use the available weight, space, and power. The Ocean Color Instrument will go on the next generation weather satellites in place of the NASA Earth Radiation Balance Experiment. The proposed Advanced Microwave Sounding will replace two existing instruments (the current Microwave and Stratospheric Sounding Units). The Navy's proposed ocean satellite requires a spacecraft the size of the current weather satellites to fly three ocean instruments: an altimeter, a scatterometer, and a microwave imager. These instruments require too much power, weight, and space to fit on a weather satellite with the weather instruments. Increasing the size of the spacecraft to accommodate both the weather and the ocean missions greatly increases spacecraft costs and complexity and launch costs.

Question #3

Japan and the European countries have both approved plans for an ocean satellite to be launched in the late 1980s, while the Soviets have an ongoing program with ocean-related satellites.

a. What should be the response and strategy of the U.S. government in view of these developments?

b. What is NOAA's response as the lead U.S. agency for civil operational satellite services?

Answer

a. The U.S. Government strategy should be to acquire those ocean data that are necessary to support the needs of the United States. The NASA SEASAT experiment demonstrated that this can be done from space. The answer to Question #1 above lists the activities underway since that demonstration.

b. NOAA's response as lead agency for civil operational satellite services is to cooperate with DoD and NASA in the NROSS effort to satisfy the higher priority data requirements of the DoD first. Many civilian requirements for ocean data will derive from the NROSS.

X. Need for a NOAA Organic Act

It has been recommended that Congress enact an Organic Act for NOAA, providing an agency charter as well as a single agency authorization. Organic legislation and/or authorization bills for NOAA have been considered in each of the last three Congresses. Opposition to an Organic Act/authorization bill has developed with other agencies, where it was perceived as a possible invasion into their programs, from the Department of Commerce, where it appeared that an organic act might be an avenue for creating an independent NOAA, and from Congressional committees, where jurisdictions have appeared to be threatened.

Question #1

What are the opinions on the need for enactment of legislation providing a NOAA Organic Act and/or single agency authorization on an annual or bi-annual basis?

Answer

An Organic Act can be a useful device to consolidate and streamline the statutory basis for an agency whose diverse programs have evolved over a long period. Several agencies with which NOAA cooperates do have organic legislation. The need for a single authorization, on the other hand, raises many questions which seem to be primarily of concern to Congressional committees. Although an Organic Act might be helpful, I don't believe that it should be considered a priority need at this time.

Question #2

NOAA is the largest agency in the Department of Commerce (59% of the proposed FY 1984 Commerce budget).

a. What are your opinions on the establishment of an independent NOAA, as envisioned in 19869 by the Stratton Commission?

b. If creation of an independent NOAA does not seem feasible now, can you tell us when such a move might be possible and what conditions must exist to permit such a move?

Answer

There are philosophical and practical dimensions to this question. Philosophically, I don't believe independent agency status in and of itself would improve NOAA's effectiveness.

In practical terms, the Department of Commerce provides a broad range of administrative services to NOAA (e.g. payroll operatiaons, etc.) that would have to be duplicated if NOAA were to become an independent agency. The Department's overall mission of advancing business and general economic development makes the Department of Commerce an appropriate home for NOAA programs. For example, NOAA works closely with the International Trade Administration to foster the development of fisheries exports.

I don't believe that NOAA's relationship with the Department of Commerce should be changed until it can be demonstrated that there is a good reason to do so. Independent agency status, by itself, does not promise any substantial benefit for the improvement of NOAA's mission performance.

Question #3

Please comment on the effects of Department policies in the recent failure to proceed with the purchase of needed computer facilities for NOAA laboratories in accordance with a previously approved plan.

Answer

In keeping with the previously approved plan, NOAA has asked each laboratory to prepare the necessary documentation for the procurement of their individual systems.

Question #4

Recently an oceans newsletter (Ocean Science News, January 3, 1983) reported that you issued a memorandum to NOAA personnel requiring them to clear messages or briefings with the Congress through yourself, the Deputy Administrator, or the Director of Congressional Affairs.

a. Was this restriction of communications between the Congress and NOAA personnel done at the direction of the Department of Commerce?

b. Why do you feel that it is necessary to restrict communications between your employees and the Congress?

Answer

4(a). No.

4(b). The memorandum was issued to ensure an orderly and coordination flow of information to Congress from NOAA.

IX. Coordination of Federal Programs in Atmospheric and Oceanic Sciences

In 1976, the Federal Coordination Council for Science, Engineering, and Technology established the Committee on Atmosphere and Oceans (CAO)1, to coordinate Federal programs in atmospheric and oceanic sciences. The Committee has languished for the past 5 years, although some subcommittee activity has continued (Subcommittees of CAO include Atmospheric Research, Marine Research, Weather Modification, and Oceanographic Fleet Coordination).

Question #1

a. What is the current status of the CAO and its Subcommittees?

b. Have these groups been meeting regularly, and, if not, how are Federal programs in the atmosphere and the oceans being coordinated?

Answer

a. The Chairman of the Federal Coordinating Council for Science, Engineering, and Technology has recently approved the reactivation of the Committee on Atmosphere and Oceans (CAO). Technically, the CAO charter expired on September 30, 1982. I expect that the CAO will begin to meet in early spring, 1983. Although the CAO will reconsider the continuation of CAO subcommittees, I expect that the present structure will remain basically intact.

b. The CAO Subcommittee on Atmospheric Research and the CAO Federal Oceanographic Fleet Coordination Council have been active during the last year. Member agencies of the CAO, including NOAA, have relied on other mechanisms for interagency coordination in program areas outside of atmospheric science and the oceanographic fleet. Federal agencies have a broad spectrum of opportunities to coordinate programs. These opportunities include statutorily created National programs (e.g. marine pollution R&D and acid precipitation research) as well as more limited bilateral agreements between agencies (e.g. the standing NOAA/U.S. Geological Survey Coordination Committee). In cases where day-to-day coordination is desirable, special mechanisms have been created for this purpose. For example, the Oceanographer of the Navy also serves as the Naval Deputy to the NOAA Administrator.

Question #2

The Federal Ocean Program, an annual report required by P.L. 89-454, has not been prepared for a number of years (the last report covered the year 1976).

a. What has happened to this report. Doesn't NOAA have principal staffing duties for preparing this report and for other CAO activities.

Answer

P.L. 89-454 directs the President to prepare an annual report to the Congress on Federal marine science programs. When the CAO was established in 1976, the responsibility to prepare the marine science report was not delegated to CAO or to NOAA. As the Chairman of CAO, the NOAA Administrator has sought the concurrence of CAO member agencies with the decision that CAO should assume the responsibility for the marine science reports. Accordingly, a five-year "catch up" report has been drafted for interagency review and clearance. This report could be made available in 1983.

It is important to consider several factors that agencies must weigh in committing resources to prepared the annual marine science report. First, many specific reports and Federal "plans" have been required by Congress since 1966 when P.L. 89-454 was passed. Many agencies believe that the other reports make the single marine science annual report somewhat redundant. Second, at a time when Federal staff and budgetary resources must be assigned the highest priority needs, not all Federal agencies with marine science programs are able to devote attention to the P.L. 89-454 report. One important fact for Federal managers is that the Congress has not expressed strong interest in the P.L. 89-454 report in recent years.

Question #3

a. What is the current status of weather modification in the Federal government?

b. Is the program balanced in view of NOAA's pulling out of weather modification research?

c. What is the status of the interagency plan for Federal weather modification research which was being prepared by the Subcommittee of the CAO?

Answer

a. The Bureau of Reclamation (BUREC) in the Department of the Interior, is now the only agency of the Federal government that maintains a program on weather modification. Its weather modification research program was first authorized in 1961 to develop methods of increasing water resources through rain and snowfall augmentation. Today the Bureau is concentrating its efforts on winter orographic precipitation enhancement while providing assistance to several rainfall augmentation programs both in the U.S. and overseas.

   The National Science Foundation (NSF) has not had a weather modification research program for several years. However, it supports a broad range of research in the atmospheric sciences, some of which contribute directly to the understanding required for the conduct of programs attempting to modify weather events. These activities include studies of cloud physics and dynamics, cloud modelling and more general meteorological processes.

b. Elimination of NOAA's weather modification research activities will have some impact on the program, but it is not likely to be critical to the total effort nor will it have significant effect on the program balance. The BUREC experimentation addresses the one aspect of weather modification with the greatest potential for both success and economic benefit - precipitation enhancement. Most of NOAA's program in recent years also concentrated on rainfall enhancement with emphasis since 1980 on cloud physics and other fundamental cloud processes. BUREC and NSF programs will continue with only minor adjustments in their plans.

c. No action has been taken on the interagency planning since March 1981 when an Advisory Panel established by the CAO Subcommittee on Weather Modification reviewed and provided comments on a draft National Weather Modification Plan. The CAO Subcommittee on Weather Modification last met on December 12, 1980. As of now, no future meetings of the Subcommittee have been scheduled.

Question #4

The CAO Subcommittee on Atmospheric Sciences has continued to meet regularly and has recently produced a comprehensive report on the national atmospheric sciences program.

a. Why has this subcommittee, staffed by the NSF, been able to maintain its coordination role effectively, while other CAO coordination responsibilities, staffed largely by NOAA, appear to be foundering?

b. What priority has been given by NOAA to interagency coordination efforts?

Answer

a. I do not believe that NOAA's coordination responsibilities are foundering. The CAO Fleet Oceanographic Coordination Council, staffed by NOAA, has been very active. It should be recognized that interagency coordination works best when affected agencies decide to work together to address real problems of mutual interest. One major reason why the atmospheric research subcommittee has been so active is that member agencies decided that action was necessary to help them meet their program requirements.

b. NOAA always has placed a high priority on its interagency coordination responsibilities. lNOAA has separate full-time professional staffs assigned to interagency coordination efforts in such areas as marine pollution R&D, meteorological services and supporting research, acid precipitation research and the National Climate Program. I believe our accomplishments in interagency leadership are noteworthy.

QUESTIONS FROM CONGRESSMAN SCHEUER
TO WILLIAM MATUSZESKI

FOR THE RECORD OF MARCH 2 HEARING

I. NOAA's Ocean Pollution Activities

Q 1. Studies are being conducted on the ocean site that was used for disposal of Philadelphia's sewage sludge until November, 1980:

- o What were the impacts of sludge disposal at the site prior to 1980?
- o Has the site "recovered" since dumping ceased?
- o Will you continue to monitor and study this and other "decomminssioned" sites?

A. In comparison with sludge discharges in New York Bight or off Southern California, the impacts of Philadelphia sludge dumping were small. This was due to the annual input volume being more than ten times smaller than at other locations and the dumpsite being possibly more dispersive. Evidence of sludge dumping in terms of sediment concentrations of chemicals or altered benthic communities does exist but only at a few locations near and southwest of the site and only at levels which are statistically, not dramatically, different from surrounding areas. No evidence of fish disease was detected at the site but there was a continued occurrence of a "black gill" condition in crabs from the area. While concentrations of fecal and total coliform bacteria in seawater at the site were not above public health limits, their occurrence did lead to a prohibition of shellfishing around the site.

Cessation of dumping led to an end to a more or less continual rain of fine grained particles which apparently caused the "black gill" condition in crabs and it no longer is observed. The absence now of fecal coliform bacteria has opened the possibility of removing the shellfishing ban. The site has, however, become somewhat of a field laboratory where the rate of disappearance of enteroviruses and total coliform bacteria in sediment can be measured. These two types of pathogens or indicator organisms have sludge as their sole source to the site. They were both still present (not at levels inconsistent with allowing shellfishing) in the spring of 1982 or about eighteen months since dumping ended.

The site is useful as a laboratory for viral and bacterial studies. Periodic collection of samples will continue. If sites receiving large inputs of sludge are "decommissioned" studies may be initiated which center on changes in the physical/chemical environment and in communities of benthic organisms.

Q 2. On page 3, you refer to deep-ocean waste-disposal sites.

- o Does EPA plan to sanction the use of an East Coast deep water site (i.e. 106-mile site) for sewage sludge disposal?
- o If so, why isn't the study for deep water sites listed as one of your major research priorities?
- o What is the consensus in the scientific community about the environmental trade-offs between using a 12-mile site vs. a 106-mile site for sewage sludge disposal?

A. The EPA issued notice in December 1982 of their intention to designate the 106-mile site for sewage sludge disposal.

Such studies are being pursued. Work is proceeding on sludge particle coagulation which will determine the rate of descent of sludge, and studies are in progress on mixing rates in the deep ocean. Proposals are being sought in the area of sensitivity of deep ocean organisms to chemical contamination. Projections have been made on the fate and effects of sludge dumped at the 106-mile site, and monitoring goals have been proposed to test those projections should dumping of sludge be initiated.

Experts generally agree that cessation of dumping at the 12-mile site would improve conditions in the area by some small amount, but that such action needs to be taken in context of alternative uses of the site. There is further indication that effects of disposing sewage sludge at the 106-mile site would be diminished by rapid dispersal. Scientifically, there are differences of opinion on the value of nearshore, confined, shallow-water sites, where impacts may be sesvere but localized and amenable to monitoring, vs. deeper, off the shelf sites, where dispersion is sought as the primary agent of disposal and where effects may be relatively less severe but more difficult to monitor.

Q 3. EPA is currently processing hundreds of waiver requests from applicants who wish to bypass secondary treatment of sewage sludge (301(h) waivers of the Clean Water Act).

- o What impact will this program have on marine pollution levels?
- o What impact will this program have on your research priorities?

A. EPA is currently reviewing 301(h) applications from 209 municipal wastewater treatment facilities throughout the U.S. If these applicants are granted secondary treatment waivers, assessment of the impacts on nearshore marine pollution levels will be difficult. Clearly a trade-off will be made between generating and disposing sludges from municipal wastewater treatment, which may or may not be ocean dumped, and the direct discharge of wastewater treatment effluents to the ocean. Marine pollution levels could increase over time as coastal population and the size of municipal wastewater systems increase.

NOAA is developing several data bases, including the adaptation of data collected by other Federal agencies, that will allow us to evaluate the total mass loading of various pollutants into the Nation's coastal waters, as well as the distribution in time and space of the living marine resources at risk. Once these data bases are complete, NOAA will conduct large-scale, comprehensive assessments of pollutant stresses on the Nation's coastal waters.

Development of these data bases for the evaluation of national marine pollution policies such as 301(h) waivers is a high priority of NOAA.

Q 4. We have learned that several hundred cases of serious food poisoning from contaminated shellfish were documented in New York and New England.

- o What caused the recent rash of food poisoning cases those areas?
- o Are our shellfish beds adequately monitored, or is this basically a problem of unscrupulous entrepeneurs?

A. Shellfish growing and harvesting is either prohibited or restricted in many of the coastal waters of New England and the Middle Atlantic states, primarily because of the high levels of bacteria, although areas can be classified for closure because of the presence of shellfish toxins, paralytic shellfish poison (PSP), radionuclides, fresh fecal contamination, and toxic industrial wastes such as mercury. Illegal harvesting within these areas is the probable cause of the recent rash of food poisoning.

Shellfish growing areas are monitored and regulated by state departments of health or environmental management. Additional information on shellfish sanitation is available from the Shellfish Sanitation Branch, Food and Drug Administration, Public Health Service, U.S. Department of Health and Human Services.

Q 5. On page 4, your stated request for Title II activities in FY 1984 is $4.8 million, vs. $7.7 million in FY 1983.

- Which specific programs would be terminated in the FY 1984 request?

A. Our $7.7 budget request in FY 1983 included $2.5 million for the Ocean Dumping Program (authorized under Section 201), $0.4 million for the Northeast Monitoring Program (under Section 201), and $4.835 for the Long-Range Effects Program (under Section 202).

The President's FY 1984 budget for activities under Title II would fund only the Long-Range Effects Program.

Q. 6 On page 4, you state, "We will reduce site-specific research that is not needed for near-term Federal decisionmaking."

- How do you determine what is needed for "near-term decisionmaking?" (A New York District Court decision or a new Secretary of Interior's offshore leasing policy can change things quickly.)
- Does this mean that NOAA will have a reduced role in performing the basic research which must underlie "Federal decisionmaking?"

A. NOAA works closely with EPA and other Federal agencies to determine regulatory schedules that rely on research findings. NOAA synthesizes available data as required and redirects its research efforts within the constraints of available resources. There is agreement that most of the data required for site-specific decisions in the near future are available. NOAA will not have a reduced role in performing various research tasks to assist in decisionmaking. Rather, it plans to redirect certain research to enhance its ability to aid decisionmaking applicable to more than individual sites or situations alone.

Q 7. On page 4, you state that "NOAA will continue its efforts to assess long-term trends in marine environmental quality..."

- If so, then why are you proposing to eliminate your Northeast Monitoring Program?
- Which remaining programs will "assess long-term trends in marine environmental quality?"

A. Many indications point to increased use of the oceans for waste disposal purposes. This is a National "trend." We plan to modify our marine pollution monitoring efforts to focus more on national problems. In this regard, we have recently begun efforts to inventory national monitoring requirements. Many of the lessons learned in the Northeast Monitoring Program are applicable and will be applied to this larger endeavor. Other efforts that will assess long-term trends in marine environmental quality include a redefined "Mussel-Watch" program, work on defining unreasonable degradation by developing quantitative indices, and efforts to implement a NOAA quality assurance system to ensure inter-regional comparisons.

Q 8. What impact will Secretary Watt's program for accelerated offshore oil and gas development have on ocean pollution? On your research planning?

A. We expect the most important and long-lasting marine effects of the Department of the Interior's (DOI) accelerated offshore oil and gas development to result from associated on-shore development, not from drilling, production, or transportation offshore. The potential effects of this program are being examined under DOI's Mineral Management Service (MMS) Environmental Studies Program which includes pre-leasing assessments and post-development monitoring programs. NOAA is working closely with DOI-MMS in the design and conduct of their Environmental Studies Program especially in the Outer Continental Shelf regions of Alaska where NOAA is managing a large portion of the studies directly for MMS. We expect this interaction to continue.

Q 9. In 1981, a New York District Court ruled that EPA could not prevent New York City from ocean-dumping sewage sludge until the agency showed that ocean dumping was a poorer option than incineration or landfill-disposal.

- Given this decision, do you anticipate that usage of ocean dumpsites will increase in the future?
- If so, why are you proposing to eliminate all monitoring of ocean dumpsites in the FY 1984 budget?

A. It is generally conceded that one effect of the Court ruling will be a relaxation of existing regulations that restrict the use of the oceans for waste disposal purposes. Whether this will have the effect of causing a greater number of dumpsites to be established has not been determined. Proposed elimination of the monitoring of dumpsites in FY 1984 budget is accompanied by a realization that monitoring strategies will need to be modified to accomodate this national outlook.

Q 10. This Committee, following the lead of the National Advisory Committee on Oceans and Atmosphere (NACOA), has argued that cross-media analysis of waste-disposal options is badly needed (i.e. comparing environmental effects of disposal on land, at sea, and by incineration). We understand that you have contracted with the National Academy of Sciences to "identify information needed to assess various options of land, sea, and air disposal."

- o What is the status of the Academy study?
- o When do you think that we might be able to use cross-media analysis as a management tool?

A. NOAA's National Marine Pollution Program Office has joined with EPA in funding a study by the Ocean Policy Committee of the National Academy of Science (NAS), "to determine what types of information are needed to assess the options of land, sea, and air disposal of given types of waste at given disposal sites and to determine the environmental, economic, and regulatory criteria for selecting among those options." A week-long workshop was held in January 1983 in which experts from a variety of pertinent fields were convened to discuss and advise on these questions. The proceedings of this workshop including the findings and recommendations will be published as a NAS report. The schedule calls for a draft of this report to be submitted to NOAA and EPA in June 1983.

Multi-media analysis as a management tool can be used to some level of effectiveness at this time. NOAA and EPA are working to establish the means for improving such analyses in the context of regional waste management decisions. EPA's sewage sludge task force will be assessing alternative management options including multi-media analysis.

Q 11. H.R. 1547, reauthorization of the Marine Protection, Research, and Sanctuaries Act of 1972, has been introduced during the 98th Congress.

- o What is your view of Section 2, which mandates specific elements in NOAA's ocean pollution program?
- o How about Section 3, which mandates both regional waste management plans and a specific regional study in the New York City region?
- o Do you agree with the provision in Section 5 by which NOAA and EPA would jointly identify, and annually report, short- and long-term research requirements associated with ocean dumping?

A. It is unnecessary to incorporate into law the specific endeavors assigned to NOAA because the intent of these amendments is already included in our programs. The National Ocean Service Office of Oceanography and Marine Services, Ocean Assessments Division, is presently working on means to define and quantify degradation, and on assessments of the marine environment to assimilate material (this is a generic effort to which much of our work applies). We are continuing to monitor the effects of ocean pollution but are modifying our approach to provide a national perspective. We are also assessing multi-media assessment methods.

Regional waste management plans would be extremely useful, and NOAA has gone on record in the past supporting development of such a plan (by EPA) in the New York Bight.

The multi-media assessment on sewage sludge disposal in the New York region should be a valuable prototype for similar assessments in other regions. The one-year time frame for completion of such an analysis and report may be too short.

Increasing the authorization limit to $12 million is not required under the Administration's present authorization plans.

Combining the annual Congressional reports for Sections 201 and 202 of the MPRSA, including work under the FWPCA, is a good step. NOAA took this approach in its FY 1981 and 1982 reports.

Having NOAA identify Title I research to meet such requirements has the effect of one agency investigating how the mission of another, EPA, should be carried out. It also conflicts with the responsibilities assigned under Section 5 of the National Ocean Pollution Planning Act, P.L. 95-273.

Q 12. The Subcommittee heard testimony last year from Mr. Willard Bascom that heavy metals and certain toxic organic compounds may not be a threat to marine animals, since many of these organisms possess the ability to "detoxify" these chemicals.

- Has NOAA been over-emphasizing the danger from heavy metals in the ocean?
- What are you doing to study Bascom's theory?

A. NOAA has been attempting to quantify rigorously the actual risks of heavy metal and toxic organic disposal in the oceans. We are examining this problem on several fronts.

(1) Through a cooperative research effort conducted by scientists at NOAA's Atlantic Oceanographic and Meteorological Laboratories, the Beaufort Laboratory of the National Marine Fisheries Service, the Massachusetts Institute of Technology, and Woods Hole Oceanographic Institution, we are examining the importance of the chemical form of disposed metals on their toxicity to marine phytoplankton, zooplankton and larval fish. Metals complexed with organic matter exhibit much lower toxicity than do free uncomplexed metals. We are presently determining the nature and types of organic materials involved and their rates of formation in marine systems to characterize allowable input rates in metals.

(2) We are examining the mechanisms and capacities of detoxification systems for metals and organics in selected marine organisms. Willard Bascom's laboratory under the Southern California Coastal Water Research Center is the contractor for the metals work and NOAA's Northwest and Alaskan Fisheries Center is investigating the metabolism and toxicity of polynuclear aromatic hydrocarbons.

(3) An important aspect of the overall risks of ocean disposal is the risk to human health from metals and toxic organics accumulated in seafood organisms. In addition to the detoxification mechanisms prevalent in marine systems, therefore, an understanding of the basic processes of transport and bioaccumalation for these substances is important. Several contractors are examining different facets of these processes under NOAA support.

Q 13. EPA has the responsibility for designating over 100 ocean dumpsites. In the Febrduary 7, 1983, Federal Register, EPA seeks to extend interim site designations because it is unable to meet its schedule for completing site designation studies for ocean dumping. Reasons given include the need for additional information on certain sites.

- How has NOAA work supported the site designation studies in the past?
- Will your proposed cuts in ocean dumping studies affect EPA's ability to carry out this program on site designation?

A. NOAA has supported site designation activities in the past in: (a) the 106-mile site, (b) 12-mile site, and (c) the proposed alternate 65-mile site (in the New York Bight). In addition, much of NOAA's data relative to living marine resources are utilized as necessary for site designation purposes. NOAA is presently working with EPA in identifying criteria for the establishment of sites through the nation generally. NOAA's proposed reductions should have no major impact on EPA's ability to carry out programs of site designation.

II. National Ocean Pollution Planning

In a July 14, 1982 report, GAO said that the tangible effects of the five-year plans produced under the Ocean Pollution Planning Act had been limited. GAO found that the plans had caused very few research projects to be started, changed, or stopped, and had little influence on the allocation of research funds. GAO recommended two actions:

- The Act be amended to give NOAA, or an interagency coordinating committee, explicit authority to review Federal budgets before their approval by OMB; and
- Future 5-year plans recommend in more detail how much money should be allocated and responsibilities divided among agencies exploring similar issues.

a. What has NOAA done in response to the GAO recommendations?

b. Would you identify the Federal ocean pollution research programs which have been initiated, modified, or terminated as a result of your efforts under the Act?

c. It does not appear that the five-year plans prepared thus far have fully complied with Section 4(b)(2) of the Act in that the plans have not contained the "catalogue of the

Federal personnel, facilities, vessels, and other equipment currently assigned to, or used for" research programs further the plans' recommended priorities.

- o Why have these provisions of the Act not been implemented?

d. In April, 1981, a panel of outside experts on oil pollution found duplication and poor planning in the Federal oil pollution studies.

- o What has been done to correct this situation?

e. Section 4(b)(4) of the Act requires a description of actions taken by NOAA and the Office of Science and Technology Policy (OSTP) to coordinate the budget review process.

- o What actions have the Administrator of NOAA and the Director of OSTP taken under this section of the Act?

A. (a) The Department of Commerce has officially responded to the recommendations contained in the report from GAO, "Need to Strengthen Coordination of Ocean Pollution Research" (see Attachment - Comments of National Marine Pollution Program Office, National Oceanic and Atmospheric Administration, Department of Commerce, July 14, 1982). As indicated by the Committee's question, two main recommendations were provided by the report.

The Department of Commerce does not support a legislative amendment to the National Ocean Pollution Planning Act to provide NOAA or an appropriate interagency committee greater authority to review ocean pollution research budgets of Federal agencies before they are submitted to OMB. The Department, instead, endorses a process of informal budget coordination with OMB, the Interagency Committee on Ocean Pollution Research, Development and Monitoring (COPRDM), and eleven Federal agencies and departments which conduct or support marine pollution research.

Since enactment of the National Ocean Pollution Planning Act, the National Marine Pollution Program Office (NMPPO) has coordinated pollution-related budget information among involved Federal agencies. NMPPO annually updates the level of Federal funding for marine pollution programs of involved Federal agencies. This information is distributed to related Federal agencies and is incorporated in the five-year National Plan and agency pollution program summaries. The possibility of conducting informal budget coordination in certain program areas has been discussed with OMB and will continue to be pursued.

The Department of Commerce has endorsed, in concept, the second recommendation offered by the GAO report. The Department, however, believes that the interagency planning process remains the best mechanism for recommending the allocation of Federal research funds and research responsibilities to agency programs. This process recognizes that responsibilities are determined per agency by separate legislative authorizations and that competition for funding occurs within an agency based on the overall mission of the agency. The interagency process can be used to identify research priorities and encourage agencies to conduct mission-related research in these areas.

The revised edition of the National Plan, issued during 1982, details how research responsibilities should be allocated among COPRDM agencies based on agency missions. Specific research and coordination tasks have been outlined for respective agencies for priority research areas. Further detail can be expected in future revisions to the plan.

(b) It is apparent to those directly involved that the interagency planning process has affected marine pollution research programs supported by the Federal government. The changes are most frequently subtle alterations in program emphasis or direction which are less obvious than program initiations or terminations. In most cases, it is difficult to establish clear cause and effect relationships, However, some examples of programmatic changes that are consistent with plan recommendations are provided below.

The GAO report indicates two areas in which the National Plan for Ocean Pollution Research, Development and Monitoring has affected either the level of funding for marine pollution research or the focus of such research. The report notes that the second plan recommended a reduced research effort for the Department of Energy's (DOE) studies of brine disposal from the strategic petroleum reserve storage areas and the Environmental Studies Program conducted by the Department of the Interior to study the effect of leasing tracts for hydrocarbon development on the Outer Continental Shelf (OCS). Since this time, the funding for DOE's Strategic Petroleum Reserve has been reduced significantly (See Attachment - Federal Marine Pollution Programs Funding Summary - April 22, 1983). The research effort of DOI's Environmental Studies Program has also undergone a major shift. Specifically, DOI's Minerals Management Service, together with NOAA and the National Science Foundation, is supporting a COPRDM effort to evaluate the need for and plan a research program to identify the long-term sublethal effects of hydrocarbon development on the OCS. The planned program will be implemented on an intergency basis led by MMS.

The GAO report also refers to disposal of dredged material as an area in which a significant level of research is conducted by three Federal agencies -- the National Oceanic and Atmospheric Administration, the Environmental Protection Agency and the Corps of Engineers (COE). The report also mentions the Plan's recommendation that research be focused on determining the chemical effects of dredged material disposal. In response to this recommendation, the COE has recently established the Long-Term Effect of Dredging Operations (LEDO) Program. Areas of research related to chemical effects include bioaccumulation and biomagnification in the aquatic environment, the development of upland plant and animal bioassay procedures and water qauality conditions. The second plan recommendation noted in the report - dredged material disposal management - is also currently being addressed by the COE as part of its regional development and monitoring programs.

A final program area includes waste disposal research. The revised Plan recommends that a regional pilot study be conducted to determine the feasibility of developing a multi-medium waste disposal management program. Based on recommendations made by EPA, COPRDM decided that it would be more productive to develop a multi-agency strategy for conducting research on ocean dumping of sewage sludge and dredged material. EPA is now preparing an ocean dumping research program plan to serve as a starting point for developing a multi-agency research strategy which will identify the areas of responsibility to be assumed by the COE, EPA and NOAA.

(c) Two National Plans have been published to date. In publishing these plans, efforts were made to gather information on Federal personnel, facilities, vessels and other equipment involved in marine pollution programs. It was found that the input from the agencies was too varied and complex to provide a useful catalogue. For the third plan, a less detailed summary of these resources will be requested from the agencies and will be incorporated in the plan to the extent possible.

(d) The group of experts, in a study conducted under the auspices of COPRDM, noted the need for "improved planning and coordination" of Federal research on the effects of oil pollution. In addition, the April 1981 report made the following specific recommendations to improve the situation:

(1) That pre-lease environmental studies be limited to only those essential for identifying areas where OCS activities could result in unacceptable impacts on highly vulnerable resources; and

(2) That a 10-year interagency research program be initiated to investigate the long-term, low-level effects of OCS and other ocean use activities. For this purpose, a subcommittee will be established under COPRDM, with the Bureau of Land Management, (now MMS), in the leadership role. Clearly defined roles will be established for all participating Federal agencies and for private industry.

These recommendations have been endorsed by COPRDM and are included in the second National Plan. COPRDM decided to focus on implementing the second recommendation; the Minerals Management Service (MMS) is now internally implementing the first recommendation.

The National Marine Pollution Program Office started to work with representatives of the MMS and NOAA's Ocean Assessments Division to implement the second recommendation in September of 1982. Considerable progress has been made since that time in planning a long-term effects program. Actions taken to date are described in the attached document, "OCS Long-Term Effects Program: Implementation Status Report".

(e) The Federal Coordinating Council for Science, Engineering and Technology operates as a division of the Office of Science and Technology Policy in the Executive Office of the President. The Council serves as an "ex officio" member of COPRDM. Budget information related to Federal marine pollution programs is distributed at COPRDM meetings and recommendations on funding for marine pollution programs and research priorities are offered at COPRDM meetings.

Additional budget coordination activity is pursued by NOAA. As noted previously, NOAA summarizes and annually updates the level of Federal funding for marine pollution programs of involved Federal agencies. This information is distributed to related Federal agencies and is incorporated in the National Plan and agency program summaries. The possibility of further budget coordination has been discussed with the Office of Management and Budget and will continue to be pursued.

QUESTIONS FOR MR. HARRISON
TO BE ANSWERED FOR THE RECORD

1. The Weather Service's long-range planning calls for elimination of field offices and centralization of various forecast and warning functions.

   o Do you believe that consolidation and centralization of offices and functions have compromised public safety in the past?

2. You mentioned in your testimony that only one of four Ocean Service Units authorized in fiscal year 1982 are operating as intended by Congress.

   o What reasons does the Weather Service give for the slow development of this program?

3. The AFOS (Automation of Field Operations and Services) system is designed to improve weather communications. In the fiscal year 1984 budget request, the Weather Service would save $3.5 million by eliminating the teletypes which serve as back-ups to AFOS.

   o Do you believe that AFOS could run reliably without these back-up units?

   o What has been the experience of field personnel with the AFOS system?

4. You spoke about the OMB Circular A-76 to examine which positions and functions in the Weather Service might be contracted out to the private sector. Would you like to make additional comments for the record on the A-76 review process?

1. The NWS has never been consolidated or centralized on this scale or with this intent in its recent history. The reduced weather warning service that are proposed for 100 communities in this country in the existing reorganization will have to compromise public safety.

2. They have not published their policies or lack of implementation. One region has pursued the implementation. The others have given this a low priority. The OSU's are certainly needed and can render valued services to the marine community. Unfortunately, NWS management does not always agree with what is best in terms of service to the public, even when directed by congress.

3. If you are asking is AFOS reliable enough to function without backup communications? The answer is no.

   The experience of field personnel with AFOS as a system is that is is not a system. It has been changed drastically from its design to what now exists in the field. Instead of one national loop we have four regional networks. Alaska has installed a completely independant different system. It is being boot strapped and rigged with smart terminals in order to get it to run even at less than promised levels. On many occasions the backup teletypes and facsimiles are the only communication links into and out of the field stations. If these are removed so will be the flow of data.

4. I don't see any comments in my presentation that indicate some functions of the NWS could be contracted. As far as the A-76 review process is concerned, I am not sure what the administration's objectives are in the review process. It certainly is not the preservation of public safety. NOAA I am told is approaching this with more zeal than any other agency. Perhaps we have been blessed with a "true believer" and other agencies have not. I did say that in the past figures have been "fudged" to justify an action. Now it won't even be necessary to fudge figures for facilities with less than 10 employees (about 200 of our NWS stations). Where there is a need for cost justification I feel certain NOAA will enhance the arithmetic to suit the objectives.

Leo R. Harrison, Jr.
Presisent, National Weather Service Employees Organization

QUESTIONS FOR DR. WASHINGTON TO BE ANSWERED FOR THE RECORD

Q 1. Did your NACOA panel find evidence that public safety warnings have deteriorated as a result of continued budget and personnel reductions in the Weather Service?

A No, we did the study because of our concern that the continued budget and personnel reductions in the National Weather Service would lead to a deterioration in public safety warnings.

Q 2. In your testimony, you mentioned that the National Weather Service represents less than one-half of the Federal resources spent on weather services (other agencies involved in weather include Department of Defense and FAA).

- Did your panel find that savings could be effected by better coordination between the agencies?
- Is greater efficiency possible through better civil-military cooperation, either in weather services or in weather satellites?

A We found that the Office of the Federal Coordinator for Meteorological Services has been effective in coordinating the services of the Federal agencies. We did not see a need for additional coordination.

We did not address the military weather services, except in noting their budgets for weather services and supporting research, and the interdependence on the exchange of data between the civil and military weather services.

Q 3. You mentioned some of the new technologies available to improve weather forecasting (new radars, satellite improvements, automated data collection).

- If we did not have resources to pay for all of these improvements, which one (or two) should have the highest priority?

A NACOA reviewed the technological advances in this report and in a previous 1981 report. All of the technological advances would be beneficial, We recommended in the 1981 report that the next generation coherent weather radar system, called NEXRAD, should receive high priority.

Q 4. Your panel argued against turning over so-called "specialized" weather services (agricultural, aviation, fire) to the private sector.

- Why?
- Do you think that the private sector might be able to supply these services adequately at some point in the future, or will it always be more cost-effective for the government to provide them?

A. We argued against turning over certain "specialized" weather services, i.e., agricultural, aviation, and marine, to the private sector because these services serve broad economic sectors where there is a high national interest. These are the areas that Congress has indicated should have specialized weather services.

We advocate a continuing role for the Federal Government to provide weather services to those areas that serve broad economic sectors. We see the role of the private sector as provider of particularized weather analyses and forecasts to meet the needs of specific clients or constituencies. The marginal cost to the Federal Government to provide the general forecasts to, say, the corn belt farmers is not much. We believe it is cost effective.

Q 5. You argue that over $1 billion in technology improvements in the Weather Service over the next decade would be worth the cost.

- What would the benefits of these new technologies be?
- How does one calculate the projected benefits?

A The benefits of new technologies would be a reduction in property damages and in loss of life. There would also be benefits to many economic sectors.

The projected benefits are difficult to calculate; we do know that billions of dollars are lost because of weather events, such as those of this past Winter and Spring. These losses could be reduced through more timely and responsive weather services and more accurate forecasts. If only a one percent reduction would be realized, millions of dollars would be saved.

The economic gains from better forecasts and warnings, while difficult to calculate, are significant. The consumption of fuel for energy, the cleaning of roads due to heavy snow, the closing of factories, interruption of construction projects, and the planting, fertilizing, spraying, and harvesting of crops, are all affected by weather events.

Q 6. You spoke about the OMB Circular A-76 to examine which positions and functions in the Weather Service might be contracted out to the private sector. Would you like to make additional comments for the record on the A-76 review process?

A We mentioned that the taking of certain weather observations can and are obtained by contracting with private companies, but NWS experience suggests there is little cost advantage to the government.

Q 7. You mention the "terrible dilemma" of the Weather Service--the need for expensive new technologies without giving up conventional services or cutting personnel--without suggesting a real resolution to the dilemma.

- Does it make sense to spend $1 billion over the next decade on technology if the Service lacks the personnel to utilize te technology?
- If you had limited additional resources, would you buy more technology or hire more meteorologists?

A The National Weather Service needs both the new technology and trained personnel. There is a certain level of manpower necessary to plan and operate a service whose effectiveness depends on interaction and responsiveness to diverse users. We believe that technology has taken the weather service a great distance in manpower conservation, and there may yet be room for further reduction. But at the present level of technology the needs are the other way. More manpower is needed. During the past decade, 1972 to 1982, the operational units of NOAA, with the exception of the satellite services, have lost personnel, although the total number of personnel in NOAA has remained relatively stable. The net reductions in the operational units have been from about 5 to 15 percent.

Q 8. The fiscal year 1984 budget proposal for the Weather Service would terminate 242 meteorological positions.

o Can you say what the effects of this reduction in staff would be?

A Loss of meteorological positions would probably lead to more centralization of functions and to loss in service or effectiveness of services at local stations. We do not believe that centralization is the answer; we found that past experience of the USAF Air Weather Service has shown that certain effectiveness in providing local weather forecasts is lost by centralizing functions.

Response of David S. Johnson to Questions Resulting from House Subcommittee on Natural Resources, Agriculture Research and Environment Hearing on NOAA's FY 1984 Budget Request for the National Weather Service

March 9, 1983

1. In your testimony, you stated that "the compelling reason for a two-satellite system is not the increased data available from the double coverage, valuable as this may be. The primary motivation is the need for an in-orbit backup."

   a. How valuable are the data from the second polar-orbiting satellite in terms of quality of forecasts?

      1.(a) The primary value is in assuring the continuity of data which only can be provided by polar-orbiting meteorological satellites. Prior to the availability of satellite data, the limit of useful weather prediction was about three days. Today, experience at the European Center for Medium Range Weather Forecasts shows that the global data supplied by the polar-orbiting satellites more than doubles this forecast limit, to about eight days. Numerical weather forecast tests run by the NASA Goddard Laboratory for Atmospheric Sciences with and without the satellite data show that the number of useful five-day forecasts more than double in a series of fourteen forecast runs by the addition of the satellite data. The NWS Global Numerical Forecast Model is now almost totally dependent on satellite data in the southern hemisphere.

      The difference in forecast quality between the coverage with two satellites operating simultaneously compared to one is less definitive. However, with only one satellite, gaps in coverage will exist in the tropics and subtropics up to about 37 degrees latitude; one-sixth of the equatorial region would be missed each day. Those regions covered by a single satellite in one day would only be observed twice in a 24-hour period rather than four times. This loss of half of the available data and the gaps in data in tropical latitudes would degrade global weather forecasts and result in significant weather features being missed altogether. In addition, the NWS Limited Fine Mesh Numerical Forecast Model requires data from both the morning and afternoon polar-orbiting satellites to reach full accuracy. Lack of data from one of the two satellites could result in a most serious degradation of the forecast accuracy for Hawaii, Alaska, and the west coast of the North American continent. Forecasts of heavy rainfall, which frequently causes severe problems in California, Oregon, and Washington, are very dependent upon full data sets from both polar-orbiting spacecraft. There are individual cases where polar-orbiting satellite data did or, if available, would have improved significantly the resulting weather forecast. In one case (11 November 1980) the satellite temperature data for the northeastern Pacific Ocean was not available in time for the operational numerical weather forecast. The resulting forecast was for a broad high pressure area with fair weather and no rain to develop over most of the eastern United States. A subsequent rerun of the forecast using the satellite data showed a stormy, low pressure system which correctly predicted an extensive area of rain.

Halem, Kalnay and Atlas of NASA GSFC suggest that the two-polar satellite system was responsible for the improved quality of the NWS three-day numerical forecasts during the period studied from December 1979 through March 1981 compared to the periods before and after when only one satellite was available.

b. Has this question of the value of the data from the second satellite ever been adequately studied?

1.(b) It is difficult to define "adequate"; what is considered adequate by one person may not be considered adequate by another. No double some improved definition of the value of the data from the second satellite could be obtained by additional study. However, I believe studies of one vs. two polar satellites begs the real question of guaranteeing at least one satellite in operation at all times.

c. Given the Administration's repeated proposal to downgrade the polar satellite system, wouldn't it make sense to initiate a study on the effects on weather forecasts of flying zero vs. one vs. two polar satellites? How much would such a study cost?

1.(c) In light of my answers to 1.(a) and (b) above, I believe the answer is no. The tests that have already been run clearly show the high value of one or two vs. no polar satellites in global weather forecasting. The cost of running definitive tests of this type (computer time and people) is very, very high, and usually hampered by lack of time available on high speed computers. The cost of additional, meaningful tests probably would be on the order of a million dollars and take about two years to conduct.

The incremental value of a second satellite in operation at the same time as one is, in my judgment, about an order of magnitude less than the incremental value of one satellite versus none. If this judgment is correct, there would be little point in studying the value of two vs. one. If it should become possible to devise a new polar-orbiting satellite and launching system in which continuity of observations could be assured with one satellite being operational instead of the present two, then the question of one vs. two spacecraft would become more meaningful.

2. You serve as consultant to the World Meteorological Organization (WMO). Has the WMO had discussions about the international community providing funding for the polar-orbiting satellites?

2. There have been informal discussions within WMO circles regarding ways in which various countries can share in the provision of satellite services, but the organization has not taken any formal steps. Actually, most countries of the world utilize the satellite data. Up to the present time, there has been a sharing of spacecraft and subsystems among

the various countries. The United Kingdom and France each provide a major subsystem on the current series of NOAA polar-orbiting weather satellites. These are provided at no cost to the United States as their contributions to an internationally necessary system. A number of European countries, through the European Space Agency, and Japan each operate a geostationary weather satellite. The USSR is developing a geostationary satellite to cover the Indian Ocean area, and India plans to launch their second INSAT, which includes a meteorological cloud camera, also to provide geostationary satellite coverage of the Indian Ocean. These satellites, coupled with the two geostationary (GOES) satellites operated by NOAA, provide cloud coverage around the earth except at high latitudes. Thus, the full international cooperative system of weather satellites now is being provided by a series of coordinated national contributions of hardware and services. International concern over proposed U.S. actions to reduce the reliability of the weather satellites in polar orbit, as well as to transfer all its weather satellites to the private sector, may result in the WMO members considering some form of "internationalized" system whereby they will no longer be vulnerable to unilateral decisions of any one nation.

3. In your testimony, you mentioned that polar-weather satellites not only provide weather data, but also locate and collect data from drifting ocean buoys, balloons, and automatic observing stations in inaccessible places.

a. How many of these remote stations "talk to" the polar satellites?

3.(a) The number of stations using the data collection and location system on the NOAA polar satellites varies from day to day. However, at the present time, about 400 stations are operating through the satellite. Of these, approximately 90% use both the data collection and platform location functions.

b. How important are the data from these remote stations in weather forecasting and in other areas?

3.(b) The use of polar satellites to locate and collect data from drifting platforms is particularly critical in the southern hemisphere and tropical regions where very few observations are now available from land and ship stations. These data are important to "calibrate" the satellite soundings, detect ocean surface conditions, etc. Other platforms provide data of importance in water resource management and flood forecasting, tracking the drift of polar ice, and providing support to a wide variety of scientific investigations. In most cases there is no economically feasible alternative to the use of the satellite system for the collection of these data.

4. You mentioned in your testimony that the joint NOAA/NASA program for development of satellites and satellite sensors is moribund. Please elaborate on that comment.

4. The joint DOC(NOAA)-NASA agreement regarding the weather satellite program calls upon NASA to develop and prove the technology needed for operational weather satellites. NASA

would fund this development as well as the construction, launch, and test of any new prototype of an operational spacecraft or sensor. Subsequently, NOAA would budget for the cost of follow-on operational spacecraft and launching and the entire cost of operations. NOAA would "contract" with NASA to obtain the operational spacecraft and for their launching according to NOAA specifications. NOAA was responsible for the conduct of the operations, applied research to improve the utilization of satellite data in weather forecasting and other applications, and the processing and use of the satellite data.

This joint effort has been an outstanding success and has worked smoothly until beginning in FY 1982 when a change in NASA priorities and funding took place. At that time, NASA ceased to budget for their portion of the agreement and left it to NOAA to pick up the funding of the development of operational spacecraft and sensors. NASA indicated they would be willing to do the development work provided NOAA would obtain and transfer the necessary funds to NASA. In the current fiscal climate, there is no way in which NOAA could pick up the large increment of funding dropped by NASA. There is also a question in my mind regarding the mission of NASA under the Space Act.

5. You spoke about the OMB Circular A-76 to examine which positions and functions in the Weather Service might be contracted out to the private sector. Would you like to make additional comments for the record on the A-76 review process?

5. I have no additional comments.

QUESTIONS AND ANSWERS FOR THE RECORD
MR. BOBBY F. McKOWN

1. You argue that private industry would be incapable of providing the same quality of service to the growers that the National Weather Service currently provides.

   a. Do you think that, over time, the private sector would adapt and learn to be as effective as the Weather Service?

No, I do not believe the private sector can adapt and learn to ever be as effective as the federal Weather Service. First, the private sector must and shall continue to be dependent upon the federal weather forecast service for basic data in order to provide further amplification of the federal weather services. They do not have the capital to maintain and utilize satellites, micro stations, etc. I believe that the private sector is and will continue to be an augmentation of the federal weather service program, as they depend upon facilities like Ruskin for raw data and feeder systems for their evaluation and forecasts. If the federal government does not continue to provide the basic resources for developing the latest technology for weather forecasting, then the state of the art cannot and will not be developed via the private weather services.

Florida Citrus Mutual also believes that if a firm had all of the agricultural frost warning service business, the total fees would not provide economic stability for long term involvement and business continuity. There would be many services, fragmented and less than capable of providing detailed, accurate narrative frost warning service data. A big, big problem is how to communicate accurate data to growers in a timely manner. The private sector cannot, where the U.S. government can.

Florida Citrus Mutual further believes that weather is of universal interest to every member of the population, the U.S. government, state governments, and is also a vital step in our cooperative stance with other countries of the world in sharing weather data.

In view of the complexity of weather information, the utilization of satellite programs and the dissemination of these weather data, it is imperative that the federal government maintain its weather forecast services and the fruit frost warning program as well.

   b. What are the possibilities that the growers might be able to subsidize the operation of the Ruskin station?

There are always possibilities that the growers might be able to subsidize the operation of the Ruskin station; however, the fruit frost warning service is a small part of the overall function of the Ruskin facility. As well, we do not have statutory taxing authority. Cattle, vegetables, ornamentals, nurseries, foliage operators, etc. would also have the benefit of the service and we do not know of any viable economical means to collect equitable fees.

We have investigated user fees and determined that the collection process would be cost prohibitive; in fact the collection system itself could cost more than the current funding of the frost warning service at Ruskin.

Florida Citrus Mutual also advances its strong belief that Florida Citrus growers already pay for the service in federal taxes, and in fact this is one of the very few services available to our members. We are not subsidized nor price supported.

2. How large was the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin station?

The Florida citrus industry sustained a 25 percent loss in our citrus crop during January 11 - 12, 1982, and if the frost warning service had not been available, we could have suffered a 50 percent loss. Cost factors involved in protecting Florida citrus and other agricultural crops from freeze damage require substantial investment of time, labor and fuel; therefore an economic impact of accurate up-to-date agricultural forecasts becomes paramount when considered from this standpoint. Three basic types of freeze protection are utilized in the Florida citrus industry: heaters, irrigation, and wind machines. Each type of system has a particular risk-benefit factor, but all three are almost totally dependent on the availability of agricultural frost and freeze forecasts and the ability to disseminate those forecasts to those who will use them -- the growers.

Based on information developed by the Polk County Agricultural ERxtension Service (an extension of Institute of Food and Agricultural Sciences, University of Florida), the following cost parameters give an indication of the tremendous fuel expense involved in protecting citrus and emphasizes the need for agricultural forecasts:

	Cost per acre/per hour
Heater Protection	$302.00
Irrigation	.93
Wind Machines	.50

Computed on the basis of an estimated 30,222 acres of protected grove in Polk County alone, the hourly cost to employ the various systems would amount to approximately $221,313 per hour. This is only one of 32 citrus producing counties located in Florida.

Depending on the severity of a freeze, a system would likely operate from between four and eight hours on a given night.

Two other factors should not be overlooked:

The estimates shown here represent only the cost for fuel to operate the various systems and do not include any capital investment, nor added labor expenses.

Finally, the projections outlined in this report relate to only one county in Florida - Polk - and represent only a portion of the overall investment and operating expenses incurred in protecting this state's citrus industry.

Clearly, for every hour a grower may delay the operation of one of these systems he is conserving money, fuel and energy. But in order to make those important decisions, growers must have accurate and timely weather information disseminated in a manner that can be used effectively.

Please be further advised that we have approximately 850,000 acres of planted citrus growing in Florida, and approximately 70 percent of the total acreage has some form of irrigation, which could be utilized in frost protection. Approximately 10 percent of the acreage could be fired with grove heaters, and then a smaller percentage utilizes wind machines. Florida Citrus Mutual sets forth that the cost/benefit ratio to the Florida citrus industry is projected at 1:17 for every hour delay of frost protection. The savings accrued to Florida growers and U.S. consumers as a direct result of the utilization of the Ruskin frost warning service would reach into the hundreds of millions of dollars.

3. Have you been in contact with fruit growers in other areas of the country, such as California, Texas, and Washington?

   a. What are their (California, Texas, and Washington fruit growers) plans for obtaining fruit frost services in the future?

Yes, Florida Citrus Mutual has been in contact with fruit growers and organizations in the states of California, Arizona and Texas. All of us researched the possibilities of alternatives in the event the national frost warning service should be discontinued, and in the early stages we all were optimistic that possibly the private sector could be utilized on a sound basis. However, after full review, California, Arizona, Texas and Florida jointly concurred that the national frost warning service is the most efficient and viable delivery system available.

4. Dr. Washington, a member of the National Advisory Committee on Oceans and Atmosphere, also testified on March 9. He stated that, if the Weather Space Service were to abandon its agricultural weather services, the Department of Agriculture would probably institute its own fragmented agricultural weather program. Do you agree?

I agree with Dr. Washington that pressure would probably come to bear within the Department of Agriculture to institute an agricultural weather program and I must say that I agree with him that at best it would be a fragmented program. Florida Citrus Mutual would not support this position at this time inasmuch as we stronghly believe that the current frost warning service within NOAA is a cost efficient system and it would be a duplication of effort to have another agency involved at this time.

However, should NOAA abandon the frost warning service, then I am sure we would be looking to Agriculture to assist in developing a viable weather program. I must reiterate again, though, Florida Citrus Mutual strongly supports retention of the current weather program.

FCM 5/31/83

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